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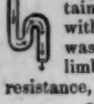
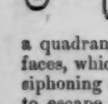
New Public Library, Boston, Mass.—The Main Facade; Main Entrance; Grand Staircase; Trustees' Room and Corridor.
Bird's-eye View of Copley Square, Boston, Mass., showing the New Public Library.

REVIEW OF THE PRINCIPLES OF SANITARY PLUMBING AS NOW ACCEPTED BY ALL LEADING SANITARIANS.

THE main object to be attained is the complete removal of waste matters from the premises the instant they are generated. This can only be accomplished by observing the following rules:—(1.) Avoid all cesspools. (2.) Make all waste-passages as small as possible to effect their purposes. (3.) Construct every fixture on the principle of the flush-tank. (4.) Make every trap seal-retaining and self-scouring. (5.) Make all joints tight. (6.) Select the simplest appliances and the simplest system consistent with safety. These rules are self-evident enough to be accepted as plumbing axioms, and are sufficient to produce perfect work. The "Sanitas" Appliances have been constructed with a view to their fulfilment in every respect, and an examination of the steps leading to the development of these appliances will best illustrate the principles of Sanitary Plumbing, showing the faults which should be avoided, and the objects which should be sought.

Beginning with the trap: In the first place mechanical seals have been discarded as being unreliable, unnecessary, and as obstructing the water-way. We start with the simplest form of water-seal trap, the ordinary S-trap. This trap answers all our requirements except that it has no power to retain its seal under the variations of atmospheric pressure occuring within the waste-pipes. To remedy this deficiency the pot-trap was developed from the S-trap by simply enlarging its upcast limb, a sufficient enlargement gives it a temporary power of resistance, but creates a cesspool having no self-cleansing power and, accordingly, the trap clogs, under sinks, with grease and ultimately loses its original resisting power. To avoid this difficulty we have turned the pot-trap on its side and reduced the size of its body. This permits the air to pass through the trap above the water without driving the latter out before it, as would be the case with a perpendicular body equally reduced in diameter. To still further increase the power of resistance to siphonage the body was next bent into a quadrangle, giving several reflecting surfaces, which throw back this water under siphoning action while they allow the air to escape, and, finally, the two parallel sides of the quadrangle were merged into a single body having a reflecting partition and a large clean-out cap. This gives us the perfected Sanitas-Trap, which has proved itself to be both anti-siphonic in properly arranged plumbing-work and substantially self-cleansing either with or without venting. It is more resisting than a vented S-trap.





The Sanitas is a Scientific System of Plumbing, having Simplicity and Safety for its Basis. It is also by far the most Economical System.

SANITAS

APPLIANCES

PLUMBING

Avoid Infringements and Imitations which are described as being "as good as the 'Sanitas;'" they are not, they are very inferior as well as illegal.

Considering next the Lavatory. These should always be constructed on the principle of the flush-tank, their discharges filling the water-passages "full-bore," so as to keep them clean. The overflow and outlet passages should be combined in the form of a stand-pipe, thus doing away with the usual foul, inaccessible and badly jointed lead overflow-pipe, and the troublesome and dirty plug and chain. The stand-pipe should be operated by a simple mechanism above the slab, for convenience and cleanliness, requiring but a single movement of the hand, and all parts should be of solid and durable construction, while the stand-pipe should be easily detachable for cleansing. The Sanitas Lavatories are all constructed after this principle, and they are the first ever so constructed. The stand-pipes are made of either plated metal or of earthenware, like the fixture itself, and the whole device produces a very ornamental effect, especially when decorated in colors to correspond with the decoration of the earthenware bowl. Finally, the ideal water-closet should have the simplicity of the short-hopper, with the sanitary advantages and convenience of the improved modern closets. More than this, it should be practically noiseless, anti-siphonic, quick-acting, self-sealing, and free from spattering or waste of water. These desiderata have been attained in the Sanitas Water-Closet of which we sketch the outline in section. The supply-pipe between the cistern and the closet discharges into the latter below the level of its standing water, and being without air-pipe, stands permanently full of water, hence the action is instantaneous and the noise of flushing is deadened. This and the peculiar construction of the flushing-rim and water-supply passages cause the waste to be discharged with wonderful speed and effectiveness; and at the same time so quietly that with the cover down and the toilet-room door closed, no sound of flushing can be heard from without. The closet is highly ornamental in appearance, hence no other wood-work is required than the seat and cover, and these may be supported directly on the earthenware itself, which is constructed with this in view. The Sanitas System, taken together, is the most economical as well as the only safe system of plumbing, as avoiding the dangers and complication of special trap venting. Whether vented or not it is now admitted that safety requires a trap to be *anti-siphonic*, the vent-pipe alone not being reliable. The Sanitas Trap holds sufficient water to resist, when properly set, any *back pressure* that can occur in good plumbing with properly vented soil-pipes. For more detailed description and illustration of the Sanitas Appliances, see our other Advertisements and the Circulars of

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WE imagine that it will surprise most people to learn that there is a technical school in New York, exclusively for girls, which has been in existence fourteen years, and graduated this year a class of nine hundred and twenty-four members, or more than the united numbers of the graduating classes of boys in all the technical schools in the Western Hemisphere. It is true that the sciences taught in the school are not of a very abstruse character, but they are of the sort best adapted at present to help girls to earn an honest living, and many a woman must bless the thoughtful charity by which she was put in the way of independence. There is still something strange to an American in the modern movement by which women have entered into nearly all the departments of industry and trade which were once monopolized by men. It is not many years since a young girl's face was a rather rare sight on Wall or State Street, and those that were seen generally belonged to persons who were shyly hurrying by on their way to a ferry or railway station. Now nearly every broker's or lawyer's office and merchant's counting-room has its gentle, industrious book-keepers and type-writers, and in many cases these modest and faithful assistants are entrusted with very great responsibility. All the girls who wish to be employed, however, cannot find places as type-writers or book-keepers, and it is a matter of much importance to the welfare of the sex to increase the number of occupations in which it can be of service. This sort of work is just what a technical school can do, and those who would like to see the weaker class of their fellow-citizens placed in a position where they need not be dependent for support upon the uncertain mercies of their male relatives will do well to keep the New York example in mind.

AMONG the subjects taught in the school are stenography and book-keeping, mechanical and free-hand drawing, sewing, both by hand and machine, cutting and fitting, music, designing, as applied to textile fabrics, wall-papers and tiles, and modelling. All the instruction given is free, and the salaries of the twelve teachers employed, as well as rent and other expenses are paid by subscription, under the care of the Young Women's Christian Association. So far as the public is concerned, the education of women in all these, as well as other kindred subjects, is an unmixed advantage. Not only are thousands of intelligent persons changed from idle and often very poor consumers to industrious and comparatively affluent producers, but the introduction of so much trained skill into the practice of the domestic arts must before long show itself in the development of those arts. The manufacture of wall-paper in this country certainly owes to a few clever women a great part of the extraordinary artistic success which it has achieved; and, to take another example, the decorative embroidery of the Associated Artists, and of Mrs. Holmes before them, give a promise for the future of American art which is hardly to be found in the painting or sculpture of the country. If we could suggest anything which might, with advantage, be added to the curriculum of this or similar schools, it would certainly be the development of the actual practice of artistic industry in other ways besides embroidery. There is no reason, for instance, why women here should not be as successful in decorative painting as the Misses Garrett and their rivals are in England. Most women are somewhat sensitive to color, but are so persuaded of their natural gift in this direction that they scorn to learn anything about the subject, and make, in consequence, laborious attempts at decoration which, to everybody except themselves, appear painfully ignorant and bald. If the same women would get rid of the notion that Heaven has already taught them a business which their brothers spend years in learning, and would, like men, make themselves acquainted with the observations of such masters as Owen Jones, Dr. Dresser and William Morris, and study and compare the work of different ages and countries, the beautful forms of the antique and the Renaissance, the brilliancy of the Japanese, and the ineffable coloring of the Chinese, they could, more easily than most men, acquire a resource and certainty which would make them the best and most rapid of decorators. The same sort of training would fit them for other artistic professions. We cannot say that we think the system of making designs for tiles and similar things, for indifferent workmen to carry out, is calculated to develop the highest artistic capacity, or produce the most beautiful art. The highest beauty can only be added by the artist's own hands, without the intervention of mechanics, and there is just now a wide field for the use of works of decoration which shall be as much autographs of the designer as an easel picture could be. To take a single example, a great deal of mosaic for the adornment of buildings is now made in Venice by an association of girls of good family, who draw and color the designs, pick out the bits of glass or stone, and send them to be put in position. Although mosaic is now a rare luxury with us, it might be popularized in this way to the general advantage. There is a sort of mosaic, useful either for floors or walls, which is made by gluing the bits of marble or glass on brown paper. The paper is then sent in sheets to the place where it is to be used, and laid with the bits of marble downward, on a bed of fresh Portland cement. When the cement has set hard the paper is washed off, and the mosaic finished by polishing with a stone. For the ornamentation of our vestibules and hearths very effective use might be made of this means. The broken bits of tile from the tile-layers answer an admirable purpose for mosaic, and give far more richness of color than can be got with marble. These might be glued on sheets by a skilful hand in such a way as to form designs of a value infinitely superior to anything yet attempted in floor or permanent wall decoration, and at a price by no means extravagantly high.

SOME English architects recently had an experience of a kind quite familiar to many of our readers, who will be glad to know how their brethren came out of it. The firm of Corbett & Son, architects, of Manchester, brought suit against Messrs. Richmond & Chandler, manufacturers, for balance of commission for services as architects in the erection of new premises in that city. The defense was the usual one, asserting negligence on the part of the architects in taking out quantities, and measuring up the work after completion, resulting, as the defendants said, in the giving of certificates to the contractors to the amount of about twenty-seven hundred dollars in excess of the sum properly due. Two architects gave evidence on behalf of the plaintiffs, and the mechanics employed on the building testified as to the character and quality of the work, and the interference of Mr. Richmond while it was going on; and another architect and two building surveyors, besides Mr. Richmond and his foreman, who acted as clerk-of-the-works, testified for the defendants. A referee was appointed by the court to hear the testimony aud determine as to questions of fact. After five days hearing, the referee reported that the first allegation of the defendants, that the

plaintiffs did not do their work properly, he did not think was supported by the evidence. There were only two other claims, one being that the plaintiffs' measurements were wrong; and the other that their prices were wrong. As to the first, he found that the architects' measurements, and those made by the agent of the defendants, differed only by three-quarters of one per cent; and it seemed to him to be "really nothing but absolute nonsense" to charge an architect with negligence in respect of measurements differing so little from those of the other side. In regard to the second question, whether the prices were fair, he was of opinion that the weight of evidence was "distinctly in favor of the plaintiffs." In summing up, he said that his conclusion was that negligence was not proved by the defendants; and he would go further, and say that "he did not remember any case in which negligence had been charged against a professional man with so little evidence to support it," and that in his opinion the counter-claim totally failed.

BEFORE many months passenger trains will be able, if the Russian Government should permit, to run directly from Paris to Persia, by way of Vienna, Bucharest, Batoum, Resht and Teheran, and the extension of the line from Teheran in one direction to the Persian Gulf, and in another, by way of Merv, to Afghanistan and a connection with the Indian system of railways, is already in contemplation. Even with the present roads, one may ride three thousand miles southeasterly from St. Petersburg without passing the Russian frontier, and if the schemes of the Russian Government are carried out, and the railway extended to the Pacific, about five thousand miles will be added to the length of the line, giving a route of some eight thousand miles entirely within Russian territory. Our own transcontinental roads sink into insignificance in comparison with such railways as this, and the completion, even of the comparatively short link needed to connect India with the European lines through Russia, will be likely to bring about some curious commercial, if not political changes.

THE REVUE SCIENTIFIQUE has published some novel statistics about the consumption of "modern excitants," in which it includes alcohol, coffee, tea and cocoa, and tobacco. The statistics seem to be made up from the official publications, showing the revenue derived from the manufacture or importation of these substances, divided by the factor representing the amount of tax per litre or kilogramme, as the case may be. From these figures it appears that the largest consumers of alcohol in the world are the Danes, who imbibe on an average nearly nine quarts apiece every year. The United States seems to come second, with a consumption of nearly six quarts; and the next place is disputed between the Dutch, Belgians, Russians and Germans, who absorb nearly equal quantities, averaging about four quarts and a half per head annually. Sweden, France and Austria are more temperate still, probably from the preference given in those countries to light wines and beer over whiskey and schnapps. England comes next, with a consumption of two and seven-tenths quarts; and then Norway with one and seventh-tenths, or less than one-fifth the quantity drunk per head in Denmark. Norway, by the way, has, by persistent temperance agitation and heavy taxation, reduced its annual average consumption of alcohol to one-half what it was thirty years ago, and is said to be the only civilized country in which any perceptible diminution has been observed during that period. Italy appears to be naturally a very temperate country, requiring annually only nine-tenths of a quart of alcohol per head to keep the spirits of its inhabitants up to a proper height.

IN regard to the consumption of tea, we have no figures for the United States, but it will not surprise tourist amateurs of the cheering cup to learn that three-fourths of all the tea brought to Europe is drunk in the kingdom of Great Britain and Ireland. Of the remaining portion, Holland, where tea is very popular among the richer classes, takes about one-half, and Denmark and Russia the rest; the people of the latter country, notwithstanding its samovars, consuming per head only about one-thirteenth as much as their English brothers. Of coffee, the Belgians are the largest consumers, the people of the United States coming next, and the Norwegians third. Germany and France consume about half as much per head as Belgium, Austria about one-fifth, and England less than one-tenth as much. In Russia, coffee is practically unknown among the lower classes, and an average of two-fifths of a pound per year apiece contents the inhabitants, as it does those of Roumania and Spain, while the Belgians need nine pounds in the same time. If the Spaniards do not care for coffee, they like cocoa, of which they consume, in various forms, eight pounds each per annum, while the French are satisfied with about six pounds. Elsewhere in Europe the consumption of this substance is insignificant.

THE foreign newspapers give a sad picture of recent building operations in Rome. As in Paris a few years ago, so in Rome within the past year or two, there has been a furious speculation in new building, and, as in Paris, a large part of the new houses seem destined to remain without tenants or purchasers, to the ruin of those who have invested money in them. Already one speculating builder, who employed about four thousand men, has gone into bankruptcy, with enormous liabilities and small assets, and so many others are expected to follow that, to avoid the disturbances which might result from turning so many unpaid mechanics into the streets, the municipal government is said to be disposed to intervene, and advance money enough to insolvent contractors to keep them on their feet a little longer. One could have more sympathy for the Roman builders if they had shown somewhat greater respect for the relics of their noble ancestors, but speculation rarely wastes any time on sentiment, and the most interesting remains of Republican Rome have been ruthlessly shovelled away to lay the foundations of new buildings. In excavating, for instance, for the new Palace of Finance, the workmen laid bare a portion of the fortification of Servius Tullius, containing the famous Porta Collina, through which the Gauls, after a defence carried on by geese as well as men, entered the city and put the inhabitants to the sword, nearly thirteen hundred years ago. We all remember the story of the victorious Gaul, who, rushing among the first into the captured town, found an old man sitting on the steps of a house. He pulled him by the beard in derision, when the old Roman turned his head and looked at him with such dignity and courage that even the barbarian was abashed. It is a pity that the modern contractor could not have unearthed one of his ancestors at the gate, whose eagle eye should forbid further desecration; but neither external nor internal miracles intervened to check the work, and the gate, through which led perhaps the track of Tullia's chariot wheels, dripping with her royal father's blood, was swept forever out of existence. In another place, a cluster of Catacombs on the Via Salara, containing at least seven thousand inscriptions, together with painted decorations, was completely cleared away, the sculptured stones, the priceless relics of early Christian faith and suffering, being scattered in all directions. More building operations are said to be in contemplation in the region of the Catacombs, and it may not be long before they are entirely destroyed.

A FIRE in a fireproof building in Boston the other day caused an amount of annoyance which a conflagration of ten times the extent would not usually have been able to produce. The operating building of the Edison Electric Company, containing seven engines and fourteen dynamos, which supply current to incandescent lights in many theatres, hotels and other buildings, and electric power to a large number of elevators and other machinery, was set in a blaze by a short circuit in an equalizer box, as is supposed, and the interior of the structure was quickly consumed, cutting off the Edison circuits from the entire city, while fire communicated to several adjoining buildings, doing a good deal of damage. The Edison building had been fitted up expressly for the business of the company and is said to have had brick floors and partition-walls throughout, but for convenience or appearance, or both, the brickwork had been sheathed, and this dry material, in the best possible condition for burning, blazed so fiercely as entirely to repel the efforts of the firemen. The next adjoining building, as it happens, is the scenery-room of the Park Theatre. Fortunately, the fire did not penetrate the dividing-wall, but it cannot be said that an electric-light station is the best sort of neighbor for a theatre.

ARCHITECT, OWNER AND BUILDER BEFORE THE LAW.[1]—III.

.Mosqve in Algiers. after L'Architecture

IF a person should be so very foolish or careless as to agree to what he did not intend, either by reading the proposition submitted to him carelessly, or not reading it at all, as sometimes happens, he will get no help from the law in trying to avoid the obligations which he has inconsiderately undertaken. No matter how oppressive or harsh the terms may be to which he has given his assent, the courts will enforce them strictly, if they do not demand anything impossible or illegal, or if no fraud can be shown to have been practised upon the party who seeks relief. To use a judge's words, the law cannot make a new contract between the parties: by writing and signing the terms to which they agree, they establish a law unto themselves; and courts, in the absence of illegality, impossibility or fraud, can only give effect to their own terms, defining them, where they are obscure, but not altering them. Even where one of the parties has signed a written agreement upon the verbal representation of the other that certain objectionable clauses will not be enforced, or will be interpreted in some favorable, but not obvious way, he is likely to find that these encouraging promises will be forgotten when the time comes for carrying them into effect, and that he is bound to the strict letter of the contract; the rule of law being that verbal explanations, modifications or understandings in regard to the subject-matter of an agreement are abolished and annulled, or rather, absorbed, by the written contract, which is presumed to be the final and perfect expression of the intentions of the parties. So strictly is this rule maintained that evidence to show that either party promised verbally to waive one of the stipulations, or not to enforce another except in certain contingencies, or to regard a third as "a mere form," is not even listened to in court, where nothing but the exact letter of the agreement, interpreted by the aid of common-sense and the dictionary, receives any attention. Illustrations of this will be given later, in treating of contracts with builders.

Where a contract, whether written or verbal, fails to describe all the duties of the parties to it, the law will supply certain stipulations to fill vacancies. Thus, if, as often happens, an architect is engaged to perform certain services, without any agreement between him and his employer as to the compensation to be paid him for those services, the employer is by law presumed to have agreed to pay a reasonable price for them, and can be compelled by legal process to pay this reasonable price. It should be observed, however, that in order to put a person under obligation to pay for services rendered him, it must be shown that he asked for them, or, at least, that he accepted the benefit of them, which is in law equivalent to a prior request. The legal principle is that no man can make another a debtor to him against his will, and voluntary proffers of sketches or other services impose upon the person to whom they are offered no obligation to pay for any of them, unless he has previously promised, as is usual in competitions, to accept one or more; or unless he accepts one of his own accord, or makes such use of it as to show that he derived some benefit from it. In either of these cases he is bound, unless he has made some agreement to the contrary with the person whose work he wishes to avail himself of, before he accepts it or takes the benefit of it, to pay what such services are fairly worth. Perhaps the cases to which architects are parties involve this principle more frequently than any other. The loose way in which competitions are carried on, with the carelessness of some architects in volunteering services which they are not sure of getting paid for, have led to an uncertainty in the matter of an architect's employment which is unknown in other professions. No one, for instance, imagines that a lawyer or doctor would spend his time and skill in preparing briefs or prescriptions which were not to be paid for unless satisfactory, and with them the evidence of the service rendered is usually all that is necessary for securing payment; but architects often find their efforts to obtain compensation for their work resisted by a claim that their services were only to be paid for if accepted, or that they were, by special agreement, to be rendered gratuitously.

It is unfortunate for the profession that this claim is in some instances well founded; and the practice indulged in by certain architects, of volunteering plans, or soliciting opportunities to "submit sketches," although it has, in years past, been sanctioned by rather illustrious examples, tells seriously against the conscientious men who believe that all their work ought to be paid for at a fair price; and in the end injures the speculators themselves, who find their assertions discredited when they really believe themselves to have been legally employed.

When cases of this kind come before the courts, it is for the jury to decide from the evidence whether the work was volunteered, or done in return for a promise that it should be paid for; and, in general, it will be necessary for the architect to give some proof that such promise was made, or that he did the work in accordance with such a request of the other party as would imply a promise to pay for it. An architect in Illinois, a resident of a certain village, was once called upon by a member of a committee, who told him that the citizens of the town intended to build a factory, and present it to a firm of manufacturers, as an inducement to the firm to remove its business to the place; and the visitor proposed that the architect, as his contribution to the cause, should prepare the plans and specifications for the building. He did so, and afterwards sued the committee-man for payment for them. The court found that no promise was shown on the part of the committee-man to pay for the plans, and that the architect could recover nothing. In a recent case, an architect, meeting frequently the principal manager of an operatic company, became interested in the plans of the company, and made drawings for an opera-house in accordance with the suggestions of his friend, who promised to use all possible influence to have them adopted by the company. Nothing more coming of the matter, the architect sued his enthusiastic acquaintance for payment for the drawings, but was defeated, on the ground that no promise had been made to pay for them.

On the other hand, if a promise is really made, or any inducement held out, by which an architect is led to spend time and trouble, he has only to show this to the satisfaction of the jury, and the court will see that he is paid. In a New York case one Nourry, an architect, sued the owner of a lot on Broadway for the value of his services in making plans for the improvement of the lot. Nourry, corroborated by another witness, testified that he was employed to draw plans for a building to be erected on the lot, and did so, and submitted them. The defendant said that Nourry came to him with an introduction, and said that he would like to show him what he could do, and would draw some plans and submit them to him. He replied that his intentions as to building were entirely unsettled, and that Mr. Thomas was his architect. Some time later, Nourry brought a lot of drawings to show him. He told him that he thought they were beautiful plans, but not adapted for use; and soon after, Nourry sent and took them away. He denied that Nourry had ever been employed by him in any way. In this case the jury believed that the conversation between the parties amounted to an employment, and the court ordered judgment for the architect.

[To be continued.]

[1] Continued from No. 572, page 276.

SIXTEEN CENT GAS.— One of the great gas companies in Philadelphia confesses to being able to make fuel gas at a cost of 16 c. per 1000 cubic feet, in the holder ready for distribution, by the use of a bench of coal retorts in connection with water-gas generators such as are in use at the Krupp works in Essen, Prussia. In a communication to *Light, Heat and Power* the exact figures are given for a daily make of 260,000 cubic feet, which amounts to exactly $40 — or less than 15 1-2 c. per 1000; and it is significantly added: "With a gas of this kind selling at 25 or 30 c. and the Welsback incandescent gas burner giving a 20-candle power light from 2 1-2 or 3 degrees of gas, we might say the gas business has just commenced."— *Exchange.*

THE ROYAL ACADEMY: THE ARCHITECTURE.

Church of the Redeemer, Lexington, Mass. E. A. P. Newcomb, Architect.

IN the architectural room we have again to regret the absence of the architect Academicians; Mr. Pearson, Mr. Norman Shaw and Mr. Waterhouse contribute nothing to the gallery. Neither does that distinguished Associate, Mr. Bodley. Their absence is a distinct loss of interest to the exhibition; more than that, it is scarcely fair to the profession that out of the six architects in the Academy four should not be represented in the only yearly display of architecture we can apparently manage to get up with any chance of success. Election to the Academy is, or ought to be, a high honor, and honors are not without their duties. It is, therefore, disappointing to find this year even worse than others of late in the conspicuousness of well-known names by reason of their absence. Perhaps Mr. Waterhouse's illness — and we regret to hear he is still far from well — may have had to do with it in his case, but what about the others? It cannot be said, as with Mr. Burne-Jones among the painters, that the conditions of the hanging and surroundings are injurious to the effect of their works. They have the architecture pretty much in their own hands, and can hang what they like and how they like. It does not look as if the honor were very highly valued among its possessors.

Of the remaining members of the Academy, Mr. Aitchison sends nothing of an architectural character — only the decoration of the ceiling and side of a drawing-room, of no particular interest whatever, so that Mr. Arthur Blomfield, the newly-elected associate, is really the only official representative of architecture at Burlington House this year. He sends a drawing of the "Entrance to the new Building" he is engaged on at historic Eton, his "New Church" at Glanadda in Wales, and the "South Porch of the Church of St. Mary," Portsea. All these works are in the phase of Perpendicular English Gothic that Mr. Blomfield is so familiar with, all very scholarly and very correct, but somewhat hard and uninteresting. This is to be regretted most at Eton, perhaps, where it will suffer from comparison with the picturesque old work of the time-honored college. The porch of St. Mary's is the best of the lot, — probably Mr. Blomfield is more at home in church work than anything else. However, let us be thankful even for small mercies. As has been pointed out, had not Mr. Blomfield come to the rescue, we should have had no architecture at all from the members of "*The* Royal Academy of Arts," a nice thing for the "*Mother* of the arts!"

Of the outsiders there are as usual far too many drawings and sketches of old work, some of which, as, for instance, the drawing of a steel sword-hilt, a bronze standard-bearer, and an Etruscan candelabrum, though very beautiful in themselves, have little or nothing to do with architecture as such apart from mere draughtsmanship. So, also, with the designs for stained-glass windows and interiors of rooms, many of which are not worth the valuable space they occupy on the walls. They represent nothing and teach nothing, and if what we hear of the number and quality of the rejected architectural works be anything near the facts, we certainly think their authors have a fair right of complaint that the space should be taken up with such works as we have just noticed. Architecture and the kindred arts by all means, but not the latter to the undue exclusion of the former. This sort of thing has been growing year by year lately and this year it is worse than ever. It is small encouragement for architects to send good drawings of their works, only to find them sent out to make room for students' sketches of old examples, however interesting, and designs by "eminent firms" for stained glass and decoration, most of which is of a very commonplace order. We should be the last to decry the benefits of clever drawing, but draughtsmanship is not architecture, though it may do much to represent it in a favorable and popular manner.

Mr. Collcutt's revised design for the "Imperial Institute" occupies the place of honor on the east wall, shown in a very beautiful pen-and-ink drawing: well, it is improved, particularly in the treatment of the tower, though that feature is still somewhat weak, but it has generally been thought out with great care, some of the smaller features have been suppressed and the larger and simpler more emphasized, to the manifest advantage of the whole design as a composition; but it still sadly lacks the grandeur and dignity we associate with the idea of anything imperial, except an "Imperial Hotel," which it still resembles more than anything else.

Two of the other designs from the recent competition are here. Those by Messrs. Deane & Son, of Dublin, and Messrs. Webb & Bell, of London. They have been already described in the pages of the *American Architect*. Messrs. Deane's design still bears the palm in all that speaks of the imperial idea, and we are forced to admit that another great opportunity has been lost in the matter of our public buildings, and we fancy this will be found out ere another ten years have passed. There are several other notable competition designs on the walls; viz., Mr. Brook's Liverpool Cathedral, shown in three magnificent pen-and-ink drawings of great vigor and power; Mr. Emerson's for the same cathedral by a very good water-color of the interior; Mr. R. Chisholm's design for the "Bombay Municipal Offices," two drawings in the Anglo-Indian style in which he has done so much, with a great dome and other Eastern features cleverly worked out; Mr. J. M. Brydon's design for the "Edinburgh Municipal Buildings," shown in two elevations, in English Renaissance, also with a dome and towers, but in marked contrast to the Bombay example; Mr. J. Coates Carter's design for the west front of Milan Cathedral, a pretentious elevation in a florid style of Gothic; two of the designs, one by Mr. William Leck and the other by Mr. Boney, in the Academy Students' Competition for a railway-station, both clever, but the former, Mr. Leck's, particularly so: it is Greek in treatment and feeling, admirably drawn, and thoroughly-well detailed. If we had such a railway-station in London, we should have something to be proud of; even Mr. Ruskin might be reconciled to railways through its influence.

Taking the ecclesiastical drawings in the order in which they come in the gallery, the first worthy of notice, and we had nearly written, the first in point of merit and drawing, is the new Roman Catholic Church at Folkestone by Mr. Leonard Stokes, shown in three views, an interior looking east, an exterior of the west front, and an interior of the Lady Chapel. For beauty of execution and expression, these drawings are almost without a rival in the room, and they show a church of late type, with a good deal of originality of treatment very thoughtfully and artistically worked out and altogether the most creditable piece of church work seen in the Academy of late years. The treatment of the triforium over the double-aisle columns is particularly worthy of notice.

In contrast to this quiet work is Mr. J. D. Sedding's New Church of the Holy Trinity, Chelsea, shown in two drawings, an exterior of the west front and an interior looking east. It is curious to notice the resemblance *in plan* between these two churches; they are strikingly alike and yet both quite out of the ordinary type of arrangement. But here the similarity ceases. Mr. Sedding is nothing if not original and some very clever churches he has given us. Here at Chelsea, though adorned with a quantity of sculpture, the effect is somewhat restless and garish. Both the east and west windows are filled with tracery of a questionable character. The church is in late Gothic, and throughout the wide nave and aisles and the west front, in bands of different-colored stone; there is a want of repose and a certain wildness which we feel sure Mr. Sedding will yet subdue. It is hardly the great town church we have a right to expect from an artist of his well-known powers.

Mr. J. O. Scott sends his design for the new bell-tower for the old Church of St. Michael's, Coventry, a fine tower in late Gothic, quite in keeping with the old work. Another very fine example of fifteenth-century Gothic is the Parish Church of St. Mary, Hornsey, by Mr. James Brooks. This looks like a veritable old English church, with a tower at the west end, a long, well-defined, clerestory chancel, with square east end and north porch, all with a typical English flavor about them, which is quite refreshing after the strong early French Mr. Brooks has given us so much of. Near this is Messrs. Dun & Hanson's "Interior of the Chapel at Stonyhurst," an extraordinary example of how fifteenth-century features may be misused. Then a small picturesque church by Mr. Sedding, "All Saints'," Falmouth, cleverly treated.

Messrs. Carpenter & Ingelow send an important work, the new choir and central tower, with restorations of transept and lady chapel, for works of Priory Church, in early Gothic and again exactly like the old work in spirit and design. The square central tower might be mistaken for the original one, of which perhaps it is a reproduction. Still another fine late Gothic church is shown by Messrs. Clarke & Micklethwaite, in a well-drawn side elevation, with very good detail.

The Mackonochie Memorial Chapel, St. Alban's Church, Holborn, by Mr. Charles Mileham, is interesting both on its own account and its associations. It is in fifteenth-century Gothic, quite unlike the early work of Mr. Butterfield's church but with a distinctive character of its own.

Among the civil and domestic or collegiate works, those of Mr. J. G. Jackson take as usual a high place. His principal contributions are three drawings of Brasenose College, Oxford. The new "Front to the High Street," the "Interior of the new Quad" and the "Interior of

the new Reading-room." The front is in every way a vast improvement on that exhibited last year, instead of the thin lifeless tower with the open crown, we have now a sturdy, well-drawn square tower flanked by a range (on each side) of charming gables fronting the celebrated High Street, designed in vigorous English Gothic of the regular Oxford type and handled with the freedom and grace for which Mr. Jackson is well known. The new quad is a most notable addition to the architecture of Oxford and in every way worthy of its conspicuous position. Mr. Warren sends a nicely-tinted drawing of the new "Barge for Magdalen College Boat-club," Oxford, a quaint reproduction of a seventeenth-century galley with a high poop-deck.

Messrs. Ernest George & Peto send no less than eight works, the full number, though some of them are hardly worthy their reputation for picturesque architecture, and most of them are small or unimportant. Among them is Mr. George's own house under the modest title of a "House on Streathan's Common." It has all the characteristic features of his work in full play and is just the sort of place we should expect to find him at home in. It is always interesting to see the kind of houses artists build for themselves. The largest work they send is "Batsford" Gloucestershire, a big house which is not at all interesting: it is simply odd and looks almost as if its author hardly knew what to do next.

In marked contrast to all these houses is the work of Mr. John Belcher, who sends six drawings, all full of interest, and thoroughly artistic in every way. Four of them represent portions of a large house at "Stowell Park," and give us the staircase, the lower hall, the drawing-room and the cloisters. Fine old English looking domestic work all of it. The staircase is most picturesquely arranged and the lower hall with its quaint fireplace is quite a gem. The drawing-room has a large fireplace with columns to the chimney-piece and rich carving above, reminding us of one of Mr. Shaw's a few years ago. "Morden Grange" is shown in bird's-eye perspective with the Dutch-looking garden beyond. The remaining drawing, "The Stables" at Northleach, is the interior of the court-yard, even more picturesque than ever though vigorous in drawing and design. It is chiefly remarkable for a quaint colonnade of stumpy columns, an angle dove cot and clock gable.

Apart from the Institute design, Mr. Aston Webb sends only a drawing of the new vicarage at Wick, Pershore. This is a very charming design shown in a most lovely drawing. It is quiet and homely and English-like. The drawing is by Mr. Charles Mallows who sends on his own behalf a "House on the Severn," near Upton in Worcestershire, a beautiful riverside house shown in one of the most dainty drawings in the whole room. The house is built close up to the river which washes its terrace wall and seems to form part and parcel of the design. It has more the appearance of having grown into shape in the course of time than a new house, so thoroughly does it fit in with its surroundings of wood and water and so admirably is it depicted.

"Victoria Coffee-house, Leicester," by Mr. E. Burgess and the "Free Library at Chester" by Mr. T. M. Lockwood, show what interesting work is being done in the country towns. The former has a kind of French-château feeling about it though the upper portion does not look as if it quite belonged to the lower. Mr. Lockwood's library is in the fine half-timbered style for which Chester is famous, is shown in a capital drawing and is altogether a very clever work.

Mr. Reginald Blomfield gives us a very good bit of Queen Anne work in the "New Buildings" for Haileyburg College, and there are also some clever schools such as Mr. Bailey's Board School at Lavender Hill. Messrs. Mitchell & Butler's design for Colfe's Grammar School at Lewisham Hill, distinguished by a very picturesque tower with porch under, and quiet good work in the main building, also some picturesque dairy-farms on the Eaton estates by Messrs. Douglas and Fordham of Chester, in the familiar Cheshire manner. What would be called an apartment-house in the States is shown by Mr. Basil Champney's "Park Mansions," a building of prodigious height and no end of suites of rooms, but not very remarkable otherwise. Mr. Arthur Haynes sends a good drawing of a house at Highgate, in the old English manor-house style, drawn in elevation and reminding one of Mr. Shaw's "Dawpool" in Cheshire.

"The London and River Plate Bank, Rosario," by Mr. William Kidner is a very good piece of Classic, one of the very few examples of buildings for commercial purposes, as also, though in quite a different style is Mr. Halsey Ricardo's "Offices in St. George Street, Westminster." This last is a striking feature with its glazed red-brick front, and white woodwork amid the dull gray houses of St. George Street.

Among the decorative work are some extremely interesting examples in fresco duro by Mr. Aldham Heaton, very cleverly designed and colored, and which give quite a new feature to the walls of the gallery. One in particular, part of a frieze in sprays of olive and vine, is gracefully drawn and admirably modelled in very low relief, helped by skilful coloring. As we have said there are many, too many, examples of decorative work, and many, too many again, very beautiful drawings of old work, but they are only interesting in a limited sense, and beyond a word of praise to the wonderful draughtsmanship do not call for any special notice.

In going through the room we have only picked out the most notable works, doubtless, there are others well worth attention, as in spite of the absence of the Academicians, the general work is of a high average and quite sustains the artistic reputation of the profession.

SOME AMERICAN MONUMENTS.[1]—III.

MEMORIALS TO WILLIAM PENN.

Statue of William Penn, in front of the Pennsylvania Hospital.

AS early as the year 1660 an attempt was made at the suggestion of George Fox, the English Quaker, to purchase a territory of the Susquehanna Indians, for the purpose of a settlement for the sect to which he belonged. This failed, because of tribal wars among them. The visit of Fox to America in 1671, strengthened his desire for a settlement, where those who wished to do so might remove with their families and enjoy the worship of God without molestation, and where their children might have proper social surroundings. It was, however, found very difficult, for the coast from Maine to Florida was either colonized or claimed, and it was not until Lord John Berkeley offered for sale his interest in New Jersey that an opportunity was afforded the Quakers to make such a purchase as they long desired. This opportunity was eagerly seized upon by Edward Byllinge and John Fenwick, both of whom belonged to the Society of Friends, but who, in this matter, acted in their individual capacity. Disagreements occurring between these two, William Penn kindly consented to act as arbitrator. Pecuniary embarrassments occurring to Byllinge, he transferred to his creditors his interest in New Jersey. Again the aid of Penn was sought, and he consented to act as joint trustee with two of Byllinge's creditors in the New Jersey estate, and thus for the first time became personally engaged in the establishment of an American colony. It is thought probable that his connection with the affairs of New Jersey determined the establishment of the Pennsylvania Province by him ten years later.

It is true that a regard for the aborigines of America, and a desire to do something for their welfare, had long occupied his mind. "I had an opening of joy as to these parts," he writes, "in the year 1661." This interest was deepened by his acquaintance with the affairs of the country as trustee for Byllinge by his association with Barclay, even before the latter became Governor of East Jersey, by his conferences with George Fox, and by his desire himself to found a colony where freedom of conscience should be regarded as the inherent right of every citizen.

This desire was soon gratified, for on October 24, 1682, William Penn landed at New Castle, Del., and in November he made a treaty with the Delawares and other tribes. The particular spot at which the treaty was held is said to have been under a venerable elm that stood on the banks of the Delaware river, at what is now known as Kensington, a part of Philadelphia, but of this there is no record. He said to the Indians, "I will not call you children, for parents sometimes chide their children too severely; nor brothers only, for brothers differ. The friendship between you and me I will not compare to a chain; for that the rains might rust, or the falling tree might break. We are the same as if one man's body were to be divided into parts: we are all one flesh and blood." To this the Indians replied, "We will live in love with William Penn and his children as long as the sun and moon shall endure." And they fulfilled this treaty. It is often said that not a drop of Quaker blood was ever shed by an Indian; and, though this is not quite true, yet it is true that Pennsylvania and New Jersey suffered much less than most of the other colonies. Pennsylvania is said to have been the only colony where the evidence of an Indian was taken in court against a white man; and the Indians proved themselves worthy of this just treatment. Penn's treaty with the Indians has always been famous as one that was never broken. Nearly a century afterwards, when the American colonies were fighting for their independence, the commander of the English army placed a sentinel under the tree to protect it from his soldiers who were cutting down the surrounding trees for fuel. It was carefully preserved until 1810, when it was blown down.

The successors of Penn did not always continue his generous treatment of the Indians, and many anecdotes are told in illustration of how the low cunning of the white man overreached the rights of the Indians.

THE PENN BUST.

In 1802 James Traquair executed a bust in marble of Penn, and presented it to the Pennsylvania Hospital. It is said to be the first bust ever made in the United States.

THE PENN STATUE.

The Penn statue was originally the property of Sir Francis Dashwood, who was Lord Le Despencer from 1763 to 1781, and stood in West Wycombe Park, England. Dashwood's successor did not

[1] Continued from page 220, No. 646.

admire the founder of Pennsylvania, and sold the statue for its value as lead. It was afterwards found in a London junk-shop by a grandson of Penn, who bought it and presented it to the Pennsylvania Hospital. It is made of lead and painted an olive green, and stands in front of the above institution. On the face of the plinth are these words: "Presented by JOHN PENN, A. D. 1804."

Upon the open scroll that the statue holds in its left hand, are these words:

CHARTER
OF PRIVILEGES TO
PENNSYLVANIA MDCC.

ALMIGHTY GOD
BEING THE ONLY
LORD OF CONSCIENCE
I DO GRANT AND DECLARE
THAT NO PERSON
WHO SHALL ACKNOWLEDGE
ONE ALMIGHTY GOD
AND PROFESS HIMSELF
OBLIGED TO LIVE QUIETLY
UNDER THE
CIVIL GOVERNMENT
SHALL BE IN ANY CASE
MOLESTED —— (rest defaced.)

The face of the pedestal of the statue bears this inscription:

WILLIAM PENN,

BORN	Penn arms	DIED
1644		1718

The words, "Mercy-Justice," are inscribed on the arms.

The pedestal is engraved with the following inscriptions on its other three sides:

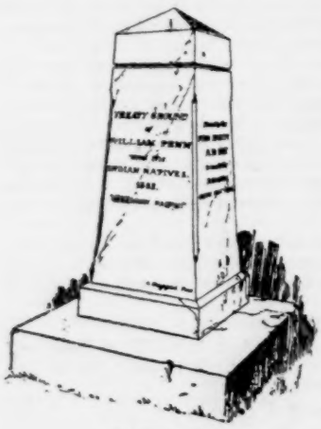
PENNSYLVANIA
GRANTED BY
CHARLES II
TO
WILLIAM PENN
1681.

RETURNED TO PENNSYLVANIA
1699
AND FINALLY WITHDREW
TO
HIS PATERNAL ESTATE
1701.

THE PROPRIETARY ARRIVED
1682
MADE
A JUST AND AMICABLE ARRANGEMENT
WITH THE NATIVES
FOR THE PURCHASE OF THEIR LAND
AND
WENT BACK TO ENGLAND
1684.

TREATY-STONE.

In 1827 the Penn Society afterwards merged into the Historical Society, erected an insignificant stone upon the spot where the treaty is supposed to have been made with the Indians. It is inscribed, on its sides, as follows:



The Treaty-stone.

TREATY-GROUND
OF
WILLIAM PENN
AND THE
INDIAN NATIVES,
1682.
"UNBROKEN FAITH."

PLACED BY THE
PENN SOCIETY
A. D. 1827
TO MARK THE SCITE
OF THE
GREAT ELM TREE.

WILLIAM PENN
BORN, 1644
DIED, 1718.

PENNSYLVANIA,
FOUNDED
1681
BY DEEDS OF PEACE.

The treaty-stone has been for many years surrounded by a shipyard.

The tower of the new City-hall, Philadelphia, which is to be five hundred and thirty-five feet high, will be surmounted by a bronze statue of Penn, thirty-six feet high, and surrounded by four other figures, twenty-five feet high.

Some years ago an attempt was made to bring the remains of Penn from Jordan's burial-ground, England, to Philadelphia, and place them under the tower upon which his statue is to stand.

In 1886 Congress was asked to appropriate money for a statue of Penn.

Among the Friends, Penn has always been highly thought of, but general appreciation of his character is of somewhat recent growth.

It is entirely at variance with the customs of the Quakers to erect monuments to the memory of the dead, and their influence has been so great for years in Philadelphia that it has prevented any project being set on foot to erect a monument to the memory of Penn.

Not long ago the Pennsylvania Peace Society sent a communication to the President of the Philadelphia Public Buildings Commission, requesting that no more statues of military men be placed about the new City-hall.

Whatever motive the Quakers may have had in not erecting monuments to the memory of their dead, it is certain that in forgetting Penn, in the form of statue and monument, they have done well from an art-point of view. If the thrifty and vain-glorious New England Puritan had done likewise, it would have been better for his reputation in every respect. Unwise actions are often out of mind and may be forgotten, but the frightful objects set up in New England, as statues and monuments, are a continual eyesore, and a permanent confession of pretense and weakness.

T. H. Bartlett.

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE GRAND BATTERY AND LAVAL UNIVERSITY, QUEBEC, CANADA.

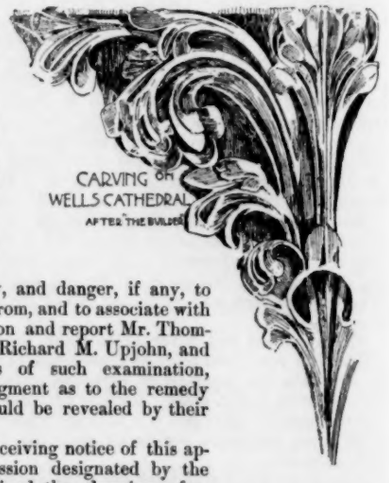
[Gelatine print, issued only with the Imperial Edition.]

THE NEW PUBLIC LIBRARY, BOSTON, MASS. — THE MAIN FACADE; MAIN ENTRANCE; GRAND STAIRCASE; TRUSTEES' ROOM, AND CORRIDOR. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

In the *American Architect* for May 26, will be found other illustrations of this building.

BIRD'S-EYE VIEW OF COPLEY SQUARE, BOSTON, MASS., SHOWING THE NEW PUBLIC LIBRARY.

REPORT TO THE GOVERNOR ON THE CONDITION OF THE ASSEMBLY CHAMBER VAULTING AT ALBANY.



SIR,—Under a concurrent resolution of the Legislature the State engineer was requested to cause an examination to be made of the Assembly Chamber in the new Capitol, and particularly the ceilings and foundations and supports thereof, for the purpose of ascertaining its present condition and stability, and danger, if any, to be apprehended therefrom, and to associate with him in such examination and report Mr. Thomas C. Clarke and Mr. Richard M. Upjohn, and to report the results of such examination, together with their judgment as to the remedy for such defects as should be revealed by their investigation.

Immediately upon receiving notice of this appointment the commission designated by the resolution met, examined the drawings furnished, and also made a personal examination of the ceiling of the Assembly Chamber. This examination revealed such a dangerous condition of things that a report was at once made to the Legislature on February 3, 1888, upon the pressing and immediate question of danger. In that report the actual condition of the ceiling was described and reference made to the numerous fractures found in it, and recommendation made that the Assembly Chamber be immediately vacated, that strong and properly-supported centrings be put up, and that the whole of the ceiling be taken down as soon as possible, and such steps taken as would relieve the pressure on the walls and supports.

Action was taken by the Assembly upon this report, and a square tower of timber was erected in the Chamber, its supports being carried to the foundations, and upon it centres were put supporting the ribs of the main vault, and subsequently an additional centre was found necessary, and put in place to support one of the ribs of the northern vault.

At the request of the committee a second report was made on March 7, 1888, confirming the recommendations of the first report that the ceiling be taken down, and adding that its place should be supplied by one of lighter construction and more favorable for Parliamentary purposes.

We now beg to submit a final report.

Before referring in detail to the ceiling of the Chamber, we desire to refer to the condition of the staircase adjacent to that Chamber. This condition is such that it must be repaired, and we judge from the examination that can at present be made, that the repairs may be effected by rebuilding the part below the first floor with new and enlarged foundations. But it is possible that further developments, when the work is entered upon, may show that it will be necessary to take down and rebuild the whole of this staircase. We think, however, that this will not be requisite.

Our examination of the foundation of the structure leads us to say that the base of the main tower, now unfinished, is very heavily loaded, and, in our opinion, it will be unwise to continue a heavy construction for this tower; and, in fact, to add any great weight upon that foundation, without, in some manner, enlarging its area.

Referring now to the Assembly Chamber, and that portion of the building above and below it, we recommend that the following portions should be removed with as little delay as possible after the close of the present session: —

1. All the groining, vaulting, and ribs above the level of the capitals of the columns .	1,438 tons.
2. The four cross walls and main arches down to the capitals of the columns . . .	1,172 "
3. The brick and iron floor over the Assembly ceiling	400 "
4. The side walls of three dormers facing on the court	220 "
Total weight removed . .	3,230 "

The weight of the two gable walls in the attic supporting the chimneys may be transferred by trusses to the walls at the side of the central arch.

It is the opinion of this commission that a design should be adopted for the reconstruction of this part of the Capitol building which will throw upon the walls and foundations as small a weight as is consistent with good construction and proper architectural effect. This can be effected by a ceiling of wood or of metal, constructed so as not to throw lateral pressure on the outer walls, and so as to load the supporting walls below the Assembly floor as little as possible.

It has been stated to us by many members of the Legislature that the acoustic properties of the stone vault of the ceiling of the Assembly Chamber were defective. We have also been informed by a number of members of that body that the acoustic properties have been decidedly improved since the temporary flat ceiling of plank has been in position. This leads to the suggestion that the new ceiling should be flat, and it may be constructed of wood or of metal, possibly with glass panels. It would then be similar in treatment to the ceilings of the Senate or House of Representatives at Washington, or to the ceiling of the Senate Chamber in the Capitol at Albany. Skilled architects can undoubtedly design such a ceiling so as to give to the Assembly Chamber a stately and ornate architectural effect. The weight of such a new construction would be much less than the present ceiling.

The brick and iron floor over the Assembly vault need not be replaced unless possibly by a light fireproof construction as a protection to the new ceiling below.

The side walls of the three dormers should be replaced by metal and slate.

When these weights are removed, and the new weight added, the walls of the rooms below the Assembly Chamber will be relieved of some 2,700 tons of load, and we do not anticipate, in that event, further serious settlements or cracks. We recommend that the golden corridor be repaired by removing the casing of the wall piers and putting in heavy iron girders at the floor level to carry these piers which now rest on brick corbels. New stone must then take the place of that which is now cracked and shattered. The casings of the temporary library should be repaired in the same manner.

When these things are done, and we believe they can be completed before the beginning of the session of 1889, this portion of the Capitol building will, in our judgment, be in a safe and permanent condition, and require only the ordinary repairs.

It seems proper that this commission should add that the lamentable condition of parts of this great building is not due to bad workmanship, because the workmanship is really very good. Neither is it due to bad foundations, because we find that the settlement of the foundations has been slight, and not very irregular, while those foundations are, in places, loaded beyond what was intended in the original design and construction. The ruin of the vaulted ceiling is due to the fact that the design and method of construction and loading of these arches and vaults have been such as to give pressures which have resulted in the disintergration of the structure — the joints being, in many places, open, and in others compressed to such an extent that the stone has splintered, and is full of cracks.

All of which is respectfully submitted.

(Signed) JOHN BOGART,
THOMAS C. CLARKE,
RICHARD M. UPJOHN.

April 16, 1888.

A VENETIAN SHIP-RAILWAY.[1]

FROM THE CHURCH OF SAINT-DENIS AFTER DECORATION

THIS paper is an abstract from a volume entitled "*Venice and the Venetians*," by Marsh. The story is now told as bearing upon the question of surmounting the American isthmus by similar means. The character of the two engineers, one the executor of the Venetian ship-railway project and the other the projector of a much more important and permanent work of this kind, are in many respects similar. Both were men of bold projects, of carefulness of details, and of entire confidence in their plans, and it is not too much to say that the engineer of the modern ship-railway, had he lived, would have as surely seen the success of his project as Sorbolo witnessed the success of his bold undertaking. . . .

The recent occupation of the city of Brescia has called renewed attention to this stronghold, which has figured extensively for many centuries in the predatory wars of the Italian States. It is an inland Gibraltar, the key of a highly-productive territory, stretching from the foot of the Lombardian Alps and commanding an extensive commerce, the Lake Garda, only a few miles distant, being the western boundary of Venetia. Brescia is built upon the summit of an extensive hill, surrounded by three successive walls, between each of which there are vast plains sufficient for the encampment of an army and for the maintenance of herds of cattle and sheep in case of siege, and from the centre of the city towers the ancient citadel, commanding every acre of ground within the walls. It is in every respect a remarkable place, but in nothing more so than in the fact that something like four and a half centuries ago, during one of its memorable sieges, it was relieved by a novel expedition sent overland by the Venetians. Immense galleys, fully manned and armed with the ponderous stone-throwing artillery of the period, were safely conveyed from the waters of the Adriatic over the plains and mountains of Italy to the Lake Garda, to do doughty warfare upon the besieging enemies of Brescia riding quietly at anchor upon the waters of the lake.

The garrison and the people of Brescia had been reduced to the direst extremities and the Milanese were in possession of all the approaches. The best engineers of Venice had discussed for many days, in the presence of the Senate, a variety of modes for effecting the desired object, and the one ultimately adopted was a scheme so bold and novel at the time as to surpass everything that had been before attempted. Of course it met with the loud execrations and ridicule of all the experienced engineers of Venice. But the man who suggested it was equal to the occasion and knew his ground. He had spent many years in superintending engineering works of considerable magnitude in the Venetian territory and had also had some experience as a soldier and knew how to handle troops. He requested that he might have an interview with the Doge and the Council, and his request was granted. He boldly stated that he was prepared to submit a plan which would afford the necessary relief to the beleaguered city. The Doge and the Council looked upon him with incredulity, wondering what fresh proposal could possibly be made by one so little known. They saw before them a man short of stature, with restless eyes and black hair, cut short about his ears, with a voice almost effeminate, but who certainly made up for his insignificant appearance by the boldness of his proposal. At a signal from the Doge, Sorbolo commenced his speech.

"Most Serene Prince," said he, "I have come to unfold a plan which I have conceived, whereby you may afford the necessary relief to the most noble city of Brescia, by placing a flotilla of ships upon the Lake Garda. It is well known that the passage by the Mincio is closed, owing to the treachery of the Duke of Mantua. Therefore, there only remains the Adige available for the purpose which I am about to submit to this reverend Assembly. I know the stream as well as I know the Grand Canal. In winter it is swollen by the rains from the mountains, and is deep enough for the passage of the largest galley. I therefore humbly suggest that up this river a fleet of ships should be sent to a point fifty miles distant from the Gulf of Venice. From thence there is a long, level country, across which it were a very easy task to carry the largest-sized ships, provided men and oxen were furnished. The chief difficulty which will beset the path is presented by the mountain of Peneda, which rises abruptly to a considerable height from the shores of a small lake

[1] Portions of a paper by E. L. Corthell, read before the Engineers' Club of Philadelphia, and published with the Proceedings of the Society.

through which I propose to pass. But this will not present an insurmountable difficulty. Having crossed the mountain, the Lake Garda is only twelve miles distant."

The venerable Doge and the august members of the Council listened in profound silence to the proposition. At first the thought occurred that the proposer must be mad, but on finishing his statement, he drew forth from a small box which he had brought with him the model of a galley, and before the view of the whole assembly, placed it upon a cradle of the kind he proposed to construct, on which to transport it overland. The plan was so simple that the doubts of the members of the College were entirely and at once swept away. The keel of the ship was fastened upon a small platform furnished with wheels, and from the projecting sides of the vessel there dropped pieces of wood, which were fastened to other pieces fixed at right angles in the frame-work of the keel. Where these two pieces of timber joined to each other wheels were placed, so that the whole mass could, by the appliance of sufficient power, be drawn along the ground.

Sorbolo was dismissed with compliments by the Doge and the whole matter was afterward laid before the Grand Council, by whom it was ultimately adopted, and the necessary instructions given for the preparation of a fleet suitable for the enterprise. The mode of conveyance was kept a profound secret, and no soldier knew the plan until fifty miles from the coast Sorbolo first put it in use. The Senate had given instructions for the preparation of six galleys, two of which were first-rate ships and the remaining four second-rate. In addition to these were twenty-five light barques, forming a most useful flotilla for the purpose designed. The galleys were fitted with all the appliances necessary for a naval combat — with heavy cannon, with stone balls, with large stores of cross-bows, arrows, lances and all the usual munitions of the period necessary for conflict with the enemy.

The command of the fleet and armament was given to Pietro Zeno, and it sailed from Venice in the middle of December, 1438. On reaching the mouth of the Adige, ample water was found to float the vessels, but the current was so strong that it was necessary not only to make use of the sails and rowers, but also of men with ropes to assist in drawing the vessels against the stream. This portion of the journey consumed one-half the time occupied in reaching the lake, and at the end of six weeks only fifty miles of water had been traversed.

Then began the labor of transporting the ships across the land. The soldiers and mariners were astounded when they were informed by Zeno and their captains that the ships were to be transported overland. They were incredulous, but Sorbolo's measures were complete. While the platforms with wheels which they had brought from Venice were being put together, a channel was dug in the bed of the river, in which the frame-work was placed, and then the galleys were towed, one after the other, on their new cradles, and oxen attached to them drew them without difficulty to the level ground. Sorbolo had dispatched agents beforehand, and when the expedition arrived at the point chosen for the overland route, they found the fields filled with oxen which had been brought for the use of the Republic. It required the united strength of six hundred oxen to draw each galley out of the water, but when they were fairly landed and on their ways, the largest of them were moved with ease by three hundred, and under the direction of the peasants who came with them, the oxen did their work in splendid style. Galley after galley was drawn from the river to the plain, and when the six largest ships stood in a row, the appearance which they presented was most curious. Their masts towered far above the tops of the trees in their vicinity, and their huge hulks, bolstered high and dry upon the land, were objects of astonishment and curiosity to all who beheld them. The ground for nearly thirty miles of the remaining fifty was quite level, and a hard frost had turned the fields into roads over which the ships passed without difficulty. . . .

Nearly three thousand oxen were engaged in drawing the vessels, and of these one thousand eight hundred were attached to the six largest galleys. The barques, mounted upon small wooden carriages of great strength, fitted with substantial rollers, gave very little trouble. The fields were covered with snow and a sharp frost prevailed, but the air was calm and the active operations in which the men were engaged kept them in excellent health and spirits.

The first day passed without the slightest mischance. In the evening, at sunset, a halt was called, and the preparations made for a substantial meal before resting for the night. Then Zeno, in the name of the captains, congratulated Sorbolo upon the complete success with which his plans were working. Day after day passed in the same way, without accident of any kind. The passage of the ships caused the greatest excitement among the peasants, who were profoundly impressed with the appearance of the great hulks moving over their fields with as much ease as if they had been a string of carts. In the daytime the creaking of the wheels, as they revolved over the frozen surface of the ground, was the only noise caused by progress of the expedition, and at night the numberless lights and camp-fires and the occasional tread of the sentinels and patrols were the only noises to be heard. There was no shouting, no hurrying to and fro, such as usually attends the movements of large bodies of men. All this had been provided for and the quiet of a well-disciplined camp observed throughout.

So long as the level ground lay before them all went well, but after crossing the small lake which Sorbolo had spoken of to the Doge and his counselors, and the almost perpendicular sides of Mount Peneda presented themselves, the soldiers looked upon the impediment with consternation, if not dismay. To drag the ships up such a place appeared to them a task of ridiculous absurdity. But Sorbolo's plans had compassed every difficulty. They anchored the fleet at a point where a little mountain-stream, like a silver thread, ran in a narrow gully to the lake. The bed of this gully was so small that only two men could walk abreast in it. The path was also obstructed by the growth of lofty pines and the mountain sides were thickly covered with giant trees. Sorbolo laughed when he saw the blank looks on the countenances of the men.

Peasants from the surrounding country had been summoned in large numbers with pick-axes and spades. They were separated into detachments and worked together with the soldiers and mariners, under the direction of captains selected for the task by Zeno and Sorbolo. In the first place, the base of the mountain had to be levelled because it rose precipitately from the ground. Then the bed of the mountain-torrent had to be widened, and finally the galleys and the barques had to be drawn up the causeway so constructed. No portion of this work daunted the men as soon as they comprehended the plans of their leaders. Hundreds of men with pick-axes soon dislodged the broken ground on the mountain sides in sufficient quantity to fill up the space between the base of the rock and the shore with a sloping causeway, while hundreds of others were employed cutting down the trees in the bed of the little stream and from the sides of the mountain in sufficient quantity to form a continuous causeway one mile in length to the summit of Peneda. All these several operations were accomplished, and after the lapse of a few days, preparations were finally made for the experiment. The levels of the roadway were pronounced perfect, and then, by direction of Sorbolo, earth was strewn upon the fallen trees and snow was shovelled upon it, which, freezing in the night, consolidated the foundation over which it was designed the ships should pass. The oxen were of no use in this work and they were driven around the small lake and up the mountain-paths to the summit, there to await the arrival of the ships. In place of them a large number of windlasses were fixed at regular distances from each other on each side of the roadway. By a proper distribution of the men in the transit of each vessel, the journey up the mountain was performed without any accident. The ropes which were attached to the windlasses and the ships were made for the purpose, under the direction of Sorbolo, in the rope-walks of the Arsenal. As each vessel, mounted upon its carriage, started up the incline, six windlasses were brought to bear at a time, and as the vessel moved upward, foot by foot, it was carefully wedged so that it could not by any mischance slip back again. Then, when each set of windlasses had performed their work, the ropes were carried on and attached to a fresh set of windlasses in advance. . . .

When the first galley appeared upon the crown of Mount Peneda, the men could not resist a hearty shout of triumph, which was echoed again and again by the sharp rocks, until it died away in a whisper upon the face of the lake below. The course of action pursued by the whole was the same. The small barques gave the men little trouble, and when the whole was finished and the fleet rested triumphantly upon the crest of the mountain, the oxen took their places again and the ships were moved majestically to the mountain-side, from whence the soldiers, sailors and peasants could see plainly far below them the clear waters of the lake. Never before or since had such a feat been accomplished, and for the first time in the world's history a fleet of war ships had ascended to the summit of a mountain. The spot chosen for the descent was one where the granite rock had been in antediluvian ages polished by the passage of icebergs down into the lake below; but in the course of ages masses of granite falling from above had broken the face of the decline, and Sorbolo found it necessary to bring his peasants and soldiers upon the scene, with their pick-axes and spades, in order to make a level road to the ground below. The face of the rock was so precipitous that the workmen found no track or path upon which even a goat could stand. But the work was accomplished in due time — masses of loose granite were dislodged and hurled below, trees were cut down and earth was shoveled upon them, as in the ascent. When all was ready the ships were carefully placed upon the causeway, but the work which the windlass men had now to perform was exactly the reverse of what it was on the other side of the mountain; for whereas it was by their efforts previously that the great ships were drawn up the steeps, now it required their utmost skill to prevent the huge weights from being precipitated to the bottom. But Sorbolo had fitted the windlasses with an appliance which greatly assisted the men. The wheels were taken from under the galleys, and as soon as the wedges were removed and the brakes applied to the windlasses, each ship moved steadily downward, slowly and majestically descending the steep incline, until at the foot of the mountain it glided quietly upon the rollers placed to receive it, and the oxen proceeded with it as before, about twelve miles to the border of the lake.

The abrupt descent was the only portion of the journey attended with misfortune; one ship, overbearing the windlasses, obtained such a momentum as to snap all the ropes asunder, and dashing madly from side to side, fell to pieces on the ground at the bottom. With this exception, the whole flotilla traversed the land and crossed the mountain in safety; and in February, 1439, every ship floated in peaceful triumph in the harbor of Torbolo, on the northeast corner

of the lake, three months only having been consumed in the journey. Zeno now took command, and in order that he might complete his arrangements for a conflict with the enemy, he ordered the haven to be strongly defended by piles, so as to prevent a surprise.

Several weeks elapsed before the Milanese discovered the presence of the Venetian ships. A light barque which had been dispatched from the opposite side of the lake to reconnoitre, first saw the flotilla. The men on the little vessel, when they saw the towering sides of the great galleys floating in the harbor of Torbolo, could not believe their own senses. They fancied at first that they beheld a mirage of the Milanese fleet which they had just left, and therefore sailed straight on until they came to the mouth of the haven and found it effectually blocked with piles, from which they could distinctly see the Venetian soldiers on the decks of the ships, and the flotilla of light barques anchored around. They were filled with astonishment and awe at what they supposed was a miraculous interposition of Providence, for they were convinced that to no human agency could such a phenomenon be attributed. The Milanese barque hastened back to the fleet and reported to the commanders, Vitaliano and Giovanni Gonzaga, the discovery they had made. The commanders considered the report incredible, but nevertheless ordered another barque to reconnoitre, and upon its return with a confirmation of the news, made immediate preparations to fit their vessels for battle. This, however, occupied many weeks, and in the meantime Zeno, having completed his arrangements, sent out his barques to reconnoitre. In the course of a few weeks more the barques of the opposing commanders met, and encounters took place which most frequently resulted in favor of the Venetians.

Meantime the arrival of a Venetian fleet upon the lake was communicated by spies to the citizens of Brescia. But the news was received with incredulity when the messenger declared that the fleet had crossed the mountain of Peneda, and the man was put into prison until the arrival of a succession of spies confirmed his story. Two serious obstacles, however, still presented themselves before any attempt could be made to relieve the city; one was the fleet of Gonzaga and the other the army of Piccinino, which was encamped between the lake and Brescia. But the presence of the Venetian fleet operated with great fear upon both commanders, and until it was removed very little progress could be made by either the Milanese fleet or army.

The condition of Brescia was at this time very serious. The food which they had was becoming exhausted, and scanty supplies only could be obtained from the surrounding country, owing to the presence of the enemy. Still every week a certain quantity of fresh food was obtained, and this, combined with the presence of the Venetians in their immediate vicinity, sustained the hopes of the besieged. Dispatches announcing the success of the expedition across the country to the lake were duly received in Venice, and in the beginning of spring preparations were made for the renewal of the conflict on land. . . . The reduction of the fortress of Tenna, then in the possession of the Milanese, was absolutely necessary, and while the army was making the approaches necessary to its investment, the flotilla under Zeno was holding the Milanese in check upon Lake Garda. On the 26th of September he determined to give them battle, and leaving his anchorage at Torbolo, was soon surrounded by the superior forces under Gonzaga and his fleet utterly destroyed. During the conflict, however, hundreds of the Venetians escaped to the shore, and under cover of the darkness succeeded in penetrating to the city of Brescia, taking with them a portion of the stores which they had brought with them.

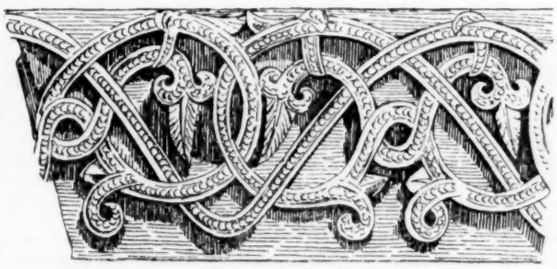
The captured ships were burnt by the Milanese, and thus perished that fleet which had performed a journey unparalleled in the history of the world. The news of the disaster was carried to Venice by Sorbolo and others, and the Senate gave immediate orders for the preparation of another fleet to take its place, which Sorbolo had undertaken a second time to carry across the country and over Peneda to the lake. But the successes of Sforza's troops rendered the immediate repetition of the feat unnecessary. . . .

Meantime Sorbolo had been busy at Venice, and early in the spring of 1440 the Venetians managed to dispatch another fleet, larger and more powerful than the first, to the Lake Garda, under the command of Stefano Contarini. He opened the campaign in April by destroying the fleet of the Milanese, and in the month of June Sforza utterly crushed the army under Piccinino; and Brescia, after sustaining a siege of three years, was permanently relieved.

But it is not the military or strategic success which finally attended these engineering operations of Sorbolo, but the operations themselves, to which we invite attention — the fact that more than four hundred years ago two formidable fleets, fitted out by the leading maritime power of the day, loaded with a complete armament for active aggressive operations, were successively carried over land and over a formidable mountain barrier, some ninety miles from the waters of the Adriatic to the Lake Garda. Nor was this accomplished by the aid of any of our modern appliances — there was no carefully graded railway, securely ballasted and bridged, provided with rails of steel and skilfully constructed locomotives. The means at hand were cordage and windlasses, oxen and manual force alone, and the roadway the most primitive imaginable.

It will be seen from the consul's letter that some of the vessels transported overland were of no inconsiderable size. The displacement of the largest class, as near as can be estimated, was over 300 tons, or a gross register of 175 tons. They were manned by at least 150 sailors, with probably a contingent on board of at least 150 marines.

THE TURKISH BATH: ITS DESIGN AND CONSTRUCTION.[1]



THE features peculiar to the bath are those requiring careful consideration. It is upon the design of the hot-rooms, the cooling-rooms, and the washing-rooms that the success or non-success of a new bathing establishment depends, and too much study cannot be given to these apartments.

THE SUDORIFIC CHAMBERS.

These are now generally required in a suite of three — "1st, 2d, and 3d Hot." The first is the tepidarium, and must be by far the largest of the three, since in it the greater number of bathers will assemble at one time. The last must be the hottest room — the laconicum — and need only be a very small one, as but few bathers use it, and that, generally, for a very short time. The second hot-room should be about midway in size, and the temperature between the first and the third. Of a given area allotted to the hot-rooms, from one-half to two-thirds may be devoted to the tepidarium, and from one-half to one-third to the super-heated rooms, always remembering that it is well to err on the side of providing a large and roomy tepidarium. Of the space allowed for the smaller rooms, one-third to one-quarter may be given to the hottest, and the remaining space to the 2d hot-room, or calidarium.

The hot-rooms, it should be remembered, are strictly bath-rooms, and must be treated as such; that is to say, the whole of the floors, walls, ceilings, partitions, and fittings, must be capable of being frequently cleansed with water. The choice of materials to be employed for lining the walls, etc., is therefore limited. And in two ways. For not only must they be of this washable nature, but they must be of a character to resist the influence of the heat. Happily, this is an age of glazed-ware and virtrified goods of every description. Glazed and fire-burnt bricks and tiles, terra-cottas, faïence, and pottery generally are now so extensively manufactured that there is little excuse for not constructing a bath throughout of materials at once washable and unaffected by high temperatures. Still, in baths where rigid economy must be studied, and lowness of cost is the great object, *plaster* may be placed upon the walls of the hot-rooms, and in its way will answer admirably, and be fairly washable. It has even one advantage — it does not become unbearably hot to the touch should the bather lean against the walls, whereas, with a highly glazed surface the walls become burning hot, and need lining with a dado of felt or other non-conducting substance. But since this latter method overcomes the objection named, the best possible material for lining the walls is glazed brickwork. In cases where elaboration is aimed at, they may be lined with marbles and faïence. With a judicious selections of colors, however, a very pleasing appearance can be given by the employment of simple glazed brickwork, and at a very moderate cost. The less heated rooms, again, may be lined with glass in panels arranged in stiles and rails of wood affixed to the rough brickwork.

The flooring in cheap baths is admirably formed by simple unglazed tile pavement over concrete. A slight roughness is very agreeable to the feet. Glazed tiles are inadmissible, as they become too hot for the naked feet; and if the slightest moisture come upon them they are rendered dangerously slippery. In elaborate baths, marble and marble mosaics may be used, but the surface must not be too smooth. In providing floorings the greatest care should be taken to avoid anything liable to become slippery to the tread.

The ceilings, of the fire and heat proof floors which, when there are other apartments above *must* be provided over the hot-rooms, may be of plaster. But the heat at the ceiling level is very great, and the plaster here rapidly darkens and blackens, and in this state looks anything but attractive in a place where the mere suspicion of uncleanliness is nauseating. If employed (and this remark also applies to plaster on walls), it should be used in the simplest manner possible, without the slightest attempt at modelling the surface. Glass may be employed for ceilings in the same way as for walls, as also may enamelled iron. The best method of ceiling would be by vaults, but is an unpracticable one, as floors of iron and concrete are generally adopted. The little laconicum, however, is best covered

[1] A paper by R. Owen Allsop, published in *Building News*.

with a flat arch, the soffit being of glazed bricks, and the springing being brought down below the main ceiling level.

When the hot rooms are in a basement in the open, they may be top-lighted, and the ceiling above need not be a heavy fireproof construction. A sufficient air-space, however, must be provided between the ceiling and roof, to prevent irradiation of heat—a remark that applies also to anything in the shape of a window to the sudatorium. They must be double or look into an area covered with pavement lights. In the case of a top-lighted room there must be a ceiling-light and a sky-light.

Where the hot rooms are constructed quite above ground, consideration must be given to prevention of loss of heat from radiation. This may be effected by providing thick hollow walls, the cavity being usefully employed for the extraction of the vitiated air.

The space allotted to the sudatory chambers may be divided into the various rooms, either by solid brickwork or by framed and glazed partitions; or again, they may be formed by a combination of solid brickwork and glazed woodwork. Any piers in these rooms must be of brickwork, iron columns being inadmissible. Masonry, too, must be discarded throughout, or used with caution. Some stones—such as red Mansfield—become black with exposure to the heat, and others fare still worse. The employment of porous and absorbent materials of any sort must be guarded against throughout this portion of the bath, as it should be remembered that effete matters, particles of waste tissue, and possibly the germs of disease, are continually being given off by the perspiring bathers, and must be prevented from finding a lodgment.

The best woods for use in the hot-rooms are close-grained and free from essential oils. Mahogany is excellently adapted for the purpose. If price were not preventive teak would be the best. Pitch pine must be discarded altogether. Deal, when employed, should be perfectly seasoned, and may then give trouble from the exudation of turpentine.

The partitions, and the doorways in them, must be placed to govern the flow of hot air. So long as the main divisions be planned with this aim in view, the separate rooms may be divided and broken up as the architect may fancy. But the constant flow of the heated air from the so-called "radiating chamber" in the hottest rooms towards the lavatorium must not be interfered with by recesses, nooks and corners, or anything that would cause the current to stagnate. And here we may see the practical advantage possessed by a bath where the hot rooms are *en suite*, and in a line with one axis. For here the air sweeps uninterruptedly through the different chambers without eddying around corners and stagnating in recesses far out of the main stream.

The doorways in the partitions should be lofty. They should not be hung with doors, as anything necessary in this way will be amply supplied by depending curtains.

No provision for draining the hot rooms is necessary, as they must, when in use, be kept free from moisture. The floors may, however, if thought desirable, be laid with an imperceptible fall the way the water would be swept when cleansing, viz., towards the lavatorium.

As the best position for a bather to assume in the sudatorium is the horizontal, a bath cannot be considered complete unless a liberal number of marble-slabbed benches be provided. These should run round the solid walls, the risers of the benches being formed of brickwork, glazed, faced with tiles, or plastered, and white marble slabs set thereon. These slabs cannot be less than 24 in. wide, and must be of the ordinary seat height—not lower. In the risers must be provided a liberal number of "hit-and-miss" ventilator gratings, the vitiated air finding its way from the space beneath the slabs in the way allowed for, which may be into surrounding areas, into hollow walls, or into flues running the whole height of the buildings.

The air at the floor line and that at the ceiling level being of vastly different temperatures, it follows that an arrangement might be designed whereby the benches might be stepped in three or four rows, and, by ascending, the bather could select any temperature he might choose. Such an arrangement was often designed in the baths of the ancient Romans, and has been tried in modern institutions; but it should be avoided. The expirations from the lungs and the exudations from the bodies of the bathers *fall*, and it therefore follows that all below the first tier would be breathing air polluted by those above them. The system, therefore, stands condemned.

As regards height, the sudorific chambers should not be too lofty, or they cannot, on the modern plan, be heated with due economy. The vastness of the old Roman tepidarium would have been impracticable under our system; but with the heat radiating direct from the walls and the floors there was no difficulty. It is better to have a comparatively low chamber with a constant stream of freshly-heated air passing through it than a lofty one with a sluggish current. From 10 to 15 or 16 ft. may be taken as moderate extremes of height in a commercial bath. The small third hot room will be less lofty if as is ordinary and most convenient, the heating-chamber be placed under it. For by raising the floor of the laconicum a few feet so as to necessitate ascending to it by a few steps from the level of the tepidarum, one can more economically construct the furnace-chamber.

This latter should be so placed that an abundant supply of fresh pure cold air can be obtained from the furnace, which, when heated, can be delivered into the hottest room above, not less than 5 ft. from the level of the floor of that chamber, and, also, where a smoke-flue of ample section can be constructed. The heated air may be delivered through gratings in the walls of the laconicum, or a shaft of rectangular section of glazed brickwork may be constructed against the end wall and coped at the required level, 5 ft. or more above the floor line. Should the exigencies of the site separate the furnace-chamber from the immediate connection with the hottest room, the heated air must be conducted from the former to the latter by means of a large shaft or shafts of glazed brickwork. Similar means may have to be employed to bring the cold air to the heating-chamber, and at the mouth of this shaft some provision must be made for filtering the air before it is brought into contact with the heating-surfaces of the furnace.

BOOKS AND PAPERS.

GUILLAUME-SULPICE CHEVALLIER was essentially a Paris *gamin*. Entering upon life on the 21st Nivôse, an XII (13th January, 1804) in the gloomy, smutty house of a coppersmith in the Rue des Vieilles-Handriettes, he seems to have passed his life, and pursued his art in the manner unto which he was born. His father had served as a national guard during the Revolution; his mother was the sister of G. Thiémet, who was both an actor in the buffoonery line of business and a caricaturist—the author of "*Les Moines Gourmands.*" When a mere boy, Gavarni was placed with an architect named Dutillard; but all he seems to have learned was to scribble a little as so many artists have done in their youth, without showing any particular talent. Later on he went to a small school in the Rue de Clichy, where he learned a little arithmetic. At thirteen he entered the shop of an instrument-maker, and at sixteen or seventeen he studied mechanical drawing at the school of the Conservatoire des Arts et Métiers. Of positive artistic training this was all, and cannot be called much; but during all his youth he was laying up a store of knowledge, which later on he was able to turn to good account. With little or no money, he ran about the streets, a mere vagabond; seeing everything and noting everything; and so upon entering on manhood, he was possessed of quick observation, good health, a desire to succeed, a perfect knowledge of the worst side of Parisian life and an uncontrollable love of pleasure—this was the mainspring of his life. Not desiring, or not being able to make his parents pay for his dissipations, he began to work with a will, knocking off little drawings for which he received a few sous. A lucky chance sent him to Bordeaux to make some drawings for one of his patrons, for which he was to receive 1,200 francs a year; but arriving in the South, and discovering the work to be uncongenial to him, he quarrelled with his employer and found himself without friends or money. Here, again, his vagabond spirit served its master; for, wandering about, apparently without purpose, he arrived at Tarbes, with only two shirts and forty-two sous, to find a friend in M. Leleu, the Public Registrar of the Department, who, taking a fancy to him, offered him board and lodging. A fac-simile of a drawing by Gavarni of his room at Tarbes is given by the author, which shows that love and care for detail which may be found in pre-Raphaelite work. For two years the caricaturist seems to have amused himself by running about the South, joining on to the circus of Gavarnie (from which he took his *nom de brosse*) and otherwise vagabondizing; always promising his parents to return. However, once in Paris, he, always putting off the day, established himself in a studio and set to work upon various series of drawings, such as the "Cris de Paris" and the "Costumes des Pyrénées," besides four little water-colors of no merit whatever. In 1830 Gavarni was fortunate enough to meet with de Girardin, who invited him to illustrate his journal *La Mode;* and it was in the office of that paper that he met many of his later friends, Balzac, Eugéne Suë and other literary celebrities of the day. Balzac asked him to illustrate his "*Peau de Chagrin;*" but it was mainly as a satirist of the dandyism of the day that the success of Gavarni was greatest. It is curious to find this *gamin* who was given to all the *sans gene* of low Parisian artistic life, who filled his letters to his friends with cutting remarks about the *ennui* that the respectables caused him, gaining a reputation by his perfectly-clad men of fashion, and his *femmes à la mode* full of coquetry and *chic*. He was a sort of Worth *au crayon*, designing dresses for women of the world, and arranging colors and costumes for Déjazet and Mme. Georges.

In 1832 Gavarni was a success, working for the *Musée des Familles*, *l'Artiste*, and a little later for the *Charivari*. Unfortunately, he was ambitious to shine as a literary man, and after publishing one or two poor specimens of fiction, he launched the *Journal des gens du Monde;* but in spite of the collaboration of such men as Charlet, De Vigny, the Johannots and Dumas, it struggled through only six months of existence and nineteen numbers, leaving its parent with a deficiency of 25,000 francs, and not a sou to pay the debts. Then came the dismal journeys to the *mont-de-piété*, the humiliating interviews with creditors, and, finally, a lodging in the Clichy goal for debtors. All this mixed up and intermingled with various kinds of dissipations, which M. Forgues excuses on the plea that Gavarni was a "true artist," and that his immoralities were simply a part of his æsthetic feeling which prevented him, in

[1] "*Gavarni*," par M. Eugéne Forgues. Librarie de l'Art, Rouam: Cité d'Anton, Paris.

company with the great army of artists, from acting like an ordinary, honest, moral human being.

In 1844 Gavarni married Jeanne de Bouabry, who was a clever musician; but neither her beauty nor her talents prevented the husband from wearying himself in his new position, married life was too prosaic for him — he liked change in all things; and so, after three years of her society, more or less interrupted, he set off for England, and so rid himself of his self-imposed restraints. M. Forgues is eloquent upon Gavarni's failure in pleasing the London fashionables; they were too reserved or phlegmatic, too full of *le cant officiel* to appreciate the artist, and he relates an anecdote which seems a witness to Gavarni's ill-manners more than to British "cant." Having accepted the commission to do a portrait of the Queen, he failed to appear, and did not even send a word of excuse or apology. M. Forgues's comment upon this specimen of ill-breeding deserves to be given in full. "*De pareilles façons expliquent suffisamment l'antipathie qu'éveilla longtemps le seul nom de Gavarni en Angleterre, et les protestations peu intelligentes qui accueillirent ses succès à son retour en France.*" After his return to Paris, Gavarni began to travel the downward path — always in pecuniary trouble, disgusted with his art, semi-maniac, passing his time mostly in his garden at Auteuil (his last passion) with his two boys. In 1852, he was offered the cross of the *légion de honneur*, and there is something exceedingly touching in his comments upon what came too late to be appreciated: "*J'ai désiré très vivement la croix quand je portais des habits, mais maintenant. . . . Et d'un coup d'œil il désignait la blouse bleue dont il s'affublait dans son jardin.*" In his last years Gavarni seems to have lost his philosophy, and worried by debts, he shut himself away from the world, eternally changing the face of his garden, forming banks and cascades, but never finishing it. In 1862, the circular railway appropriated this, his last love, and he was obliged to move in spite of the intervention of the Princess Matilde with Louis Napoléon. He died soon after this misfortune, almost forgotten amidst the political troubles and passions, which, towards the end of the Emperor's reign, were stirring the French nation.

Gavarni was not only a draughtsman, but his work was generally supplemented by his text; and perhaps one of the best of his drawings is the impudent street arab with his hands in his pockets and his head tossed up: "*Si mon pince-nez m 'empêche de voir, ça ne regarde personne!*" Many of his drawings are grotesque, but without the humor of Jacques Callot, or the satire of Hogarth. Gavarni painted the disreputable side of human nature in the manner of Zola — witness his two figures "*Le gin;*" his rollicking "*Jalouret, vous êtes un polisson!*" and "*Mon épouse, serait elle légère?*" which are repulsively humorous, but are certainly not moral satires. Gavarni does not teach, as Hogarth does, the results of depravity. But for dexterity and facility with pen, pencil, and brush, there is no one perhaps his equal. What Daumier did for the law, Gavarni did for Parisian low-life; but whether a caricaturist of this nature will survive our generation is questionable. Hogarth lives and will live in spite of his satires being out of date; but Hogarth was above all things a fine painter. Whether his reputation would have survived until the present day, had it depended only upon his engravings, is a matter upon which there can scarcely be two opinions. On the other hand the reputation of Gavarni rests almost entirely upon his printed works, and many of these are now considerably out of date. Fashions, which are not old enough to be picturesque, are not particularly interesting.

It ought to be stated that the author of this life of Gavarni, is the son of the artist's great friend; which accounts for and excuses M. Forgues's somewhat excessive partiality for the clever caricaturist.

S. BEALE.

COMMUNICATIONS

CHANCES FOR THE MORALLY-INFIRM.

JOLIET, ILL.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I enclose you three letters recently received which offer a commission to architects for whatever goods may be specified of these particular manufacturers. It occurs to me that the proper disposition of such letters addressed to any architect is to send them as once to a publication like the *American Architect*, who should publish the full text and the firms' names. By so doing they would readily meet the eyes of architects who desire to do business in that way and those that do not would as readily know what firms to avoid. This commission (or boodle) business of architects is entirely illegitimate and is at present the greatest standing shadow over the profession; the sooner it can be done away with the better for the profession at large, and I see no better way of doing it than mentioned above. Very truly yours, F. S. ALLEN.

CHICAGO, April, 23, 1888.

MR. F. S. ALLEN: —

Dear Sir, — We shall be pleased to figure on any Stained Glass you may have, and in consideration of its being less expense to solicit outside orders, I will offer you 10 per cent on all orders you may send us. We will submit designs and hope to receive your orders.

Yours truly, MAX SUEZZ, *Manager.*

CHICAGO, April 24, 1888.

F. S. ALLEN, ESQ: —

Dear Sir, — Will you kindly examine our circulars, and on any Counter you may cause to be sold we will allow ten per cent on selling price. Our counters are better finished than anything on the market at present, as this work is done before the counter is put together, and by a special process of our own invention. The counter ships at almost lumber rates, while a bright boy can set it up. Where we have put this counter it has pleased every one, whether owner or customer at store. It is neat and cleans perfectly with a duster as there is not a point where dust can collect. We make this in hard wood at $1.75 to $3.50 per running foot as per circular measure. On Store Stools will allow 20 per cent from list except on No. 1, which will be ten per cent; however, we do not suppose you will recomend the poorest on the list. These "Noiseless Stools" have displaced others in many instances, owing to this desirable feature. We enclose a postal, trespassing on good nature to request a brief reply to our lines.

Yours very truly, DUNLAP & CO.

UTICA, N. Y., May 5, 1888.

MR. F. S. ALLEN: —

Dear Sir, — We mail you to-day under separate cover our new complete illustrated catalogue for 1888. After an examination of the many superior points and merits of the Carton Warm Air Furnace, you think you can conscientiously specify the same in your specifications for new dwellings and buildings, we would feel well disposed to compensate you for your labors in our behalf. We hope this request may receive your attention, and that we may have the pleasure of hearing from you in relation to the same.

Yours respectfully, Carton Furnace Co.,
E. A. CARTON, *Sec. & Treas.*

A CORRECTION.

LONDON, ENG., May 25, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you let me correct a misprint on page 222 in my "Paris Churches"? The curious ceremony of the *pain bénit*, is made more so, by the statement that "the donor is presented with a *pat and a kiss*," which ought to read, "a *pax* to kiss."

Yours faithfully, S. BEALE.

TO CURE A DOOR IN WIND.

PHILADELPHIA, May 25, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Can any of your readers suggest, or inform me if they are cognizant of any method by which a twisted door can be made straight? In considering an answer to the above query I apprehended that correspondents will conjecture the kind and situation of the doors. The doors I have in mind when asking the question are veneered with the same kind of wood upon both sides, and have since first they were hung been subject to the same temperature upon each side, if there is such a thing as the possible straightening of a door out of "wind" I have no doubt it will interest a great many of your readers to know of it. ARCHITECT.

[A DOOR may often be taken out of wind, temporarily at least, by clamping in a frame and allowing it to remain for a time. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

BRITISH INTEREST IN OUR STRIKES. — According to a report from the British Minister at Washington, which has just been laid before Parliament, since the beginning of 1887 there have been 1,000 strikes in the United States, and of the 400,000 men engaged in them 25,000 to 50,000 are still out. The most serious was that of the New Jersey coal-handlers, which involved a loss in wages to those engaged of more than £500,000. The cost to the workers of the Pennsylvanian coke-workers' strike of the Spring, in which 13,000 men were engaged for 10 weeks, was about £200,000 in wages More than two-thirds of the strikes between January and July, 1887, were fruitless and only brought loss and suffering to those engaged n them. As a whole, about 38 per cent., or more than a third of the strikers in 1887, succeeded in getting their demands, against 20 per cent in 1886. It is calculated that nearly 10,000,000 days' work and wages were lost. — *Pall Mall Gazette.*

DONE IN A MINUTE. — "Well, well, don't fret; I'll be there in a minute."

But, my friend, a minute means a good deal, notwithstanding you affect to hold it of no consequence. Did you ever stop to think what may happen in a minute? No. Well, while you are murdering a minute for yourself and one for me, before you get ready to sit down to the business we have in hand, I will amuse you by telling you some things that will happen meantime.

In a minute we shall be whirled around on the outside of the earth by its diurnal motion a distance of 13 miles. At the same time we shall have gone along with the earth, in its grand journey around the sun,

1,080 miles. Pretty quick travelling you say? Why, that is slow work compared with the rate of travel of that ray of light which just now reflected from that mirror made you wink. A minute ago that ray was 11,160,000 miles away.

In a minute, over all the world, about eighty new-born infants have each raised a wail of protest at the fates for thrusting existence upon them, while as many more human beings, weary with the struggle of life, have opened their lips to utter their last sigh.

In a minute the lowest sound your ear can catch has been made by 900 vibrations, while the highest tone reached you after making 2,228,000 vibrations.

In a minute an express train goes a mile and a Cleveland street-car 32 rods; the fastest trotting horse, 147 9-13 rods, and an average pedestrian of the genus homo has got over 16 rods.

In each minute in the United States, night and day, all the year round, twenty-four barrels of beer have to go down 12,096 throats, and 4,830 bushels of grain have come to bin.

If there were a box kept at the City Hall in the city of Cleveland into which every minute a sum sufficient to pay the interest on the city debt had to be dropped, the sum so dropped each minute of the whole year would be 87 cents.

How about national finances? Well, sir, in the same way, each minute, night and day, by the official reports for the year 1886, the United States collected $639 and spent $461; $178 more than necessary. The interest on the public debt was $96 a minute, or just exactly equal to the amount of silver mined in that time.

Now, in the residue of figures I give, you will remember that they represent so much for every minute in the year. All the preceding figures should be so considered. And remember, also, that we are all the time, hereafter talking about facts connected with the whole United States.

The telephone is used 595 times the telegraph 136 times. Of tobacco, 925 pounds are raised, and part of it has been used in making 6,673 cigars, and some more of it has gone up in the smoke of 2,292 cigarettes.

But I am afraid that you will forget that we are talking about a minute, sixty seconds of time. No? Well, then, every minute 600 pounds of wool grow in this country, and we have to dig sixty-one tons of anthracite coal and 300 tons of bituminous coal, while of pig iron we turn out twelve tons and of steel rails three tons.

In this minute you have kept me waiting, fifteen kegs of nails have been made, twelve bales of cotton from the fields, and thirty-six bushels of grain gone into 149 gallons of spirits, while $66 in gold should have been dug out of the earth. In the same time the United States mint turned out gold and silver coin to the value of $121, and forty-two acres of the public domain have been sold or given away. — *Cleveland Press.*

Ruskin's Guild of St. George. — The enthusiastic beginning and the rather sad decline of Ruskin's "Guild of St. George," which was to elevate manual labor and the taste of the British public in literature and art, is narrated by Philip G. Hubert, Jr, in the current number of *Lippincott's Magazine*. The idea of the guild was given in "*Fors Clavigera*" in 1874. A community was to be formed in which the work should be done with tools, — no machinery being permitted except for tasks beyond human strength. Museums of mineralogy and art were to be provided, and it was expected that they would serve as a refreshment to the laborer after his toil was done. Children were to be educated in bravery and beauty, and the birthdays of heroes were to be observed with morning and evening services. There was to be no rivalry, but each member of the guild bound himself to use his efforts "for the help, delight and honor of others." The guild started out with Ruskin as master and thirty-two "companions." It has at present not more than sixty members. Land on which the experiment could be carried out was not obtained for several years, and when it was secured the plan did not work. As Mr. Hubert says: "Farm laborers who could grow good cabbages proved to be deaf to the teachings of poetry and art; poets who saw much in the simple primrose were too much taken up in its contemplation to find time for the cabbages." So part of the land is now used as a market garden, and other small tracts, obtained by gift at various times, are leased. The chief work of the members of the guild consists in collecting money and material for a little museum at Sheffield founded by the guild, and in the encouragement of hand-weaving and spinning and of handiwork of various kinds. The last report issued by Ruskin was made in January, 1886, and in it he shows much discouragement. The lack of support given his scheme he attributes to "the hard-heartedness incident to the pursuit of wealth," and says that "from the whole continent of America, which pirates all my books and disgraces me by base copies of the plates of them, I have never had a sixpence sent to help me in anything I wanted to do." — *Springfield Republican.*

A Long Tunnel. — A contract has been entered into between the Board of Direction of the Valley of Mexico and Mr. J. Gladwyn Jebb, representing the London-Mexican Prospecting and Finance Company, limited, for the execution of the work known as the Toquixquiac Tunnel. The work is to cost $2,350,000, covered by 7 per cent city bonds, issued at 82½ and running for at least ten years, the ultimate period of liquidation being fixed at thirty years. A sinking fund of 1 per cent. per annum on the total issue is provided for. The limit fixed for the completion of the work is two and a half years, counting from the date of the formal transfer of the tunnel to the company, but practically three years are allowed, as it is stated that each day over three years employed by the company on the work shall cause a fine of $300 to be deducted from the amount due the company on final liquidation. On the other hand, for each day less than two-and-a-half years saved by the company, a premium of $300 shall be awarded them. It is distinctly stipulated that the money raised by the emission of the bonds shall be devoted exclusively to the tunnel. The total length of the tunnel is 9.520 miles, of which there is already completed a trifle less than 1.000 miles. There are to be 23 shafts, of which 5 are already sunk. The tunnel will be brick-lined throughout, with an inner cement coating, and the stipulations of the tunnel contract call for first-class work. — *N. Y. Evening Post.*

TRADE SURVEYS

Manufacturers and builders are once again taking their trade bearings, with a view of arriving at some sort of an opinion as to the probabilities of the coming six months. The facts surrounding the market are as follows: Money is in abundant supply and the rate of interest low; investors feel about as much confidence in the general situation as they have done at any time this season: there are no indications of coming disaster; there is less apprehension now than at any time for months of any upsetting tariff legislation; financial questions will be left to take care of themselves, and as little legislation as possible will be enacted; all vexing issues will be left for the consideration of future Congresses. Manufacturers in a general way are restricting production, and fighting the downward tendency in prices as well as they can. Jobbers are distributing goods only to meet the actual market requirements, and are making no efforts to unload stocks as they did in former years, regardless of prices or the ability of purchasers to pay. The volume of "paper" is a little larger than it has been for some time, but has not reached dangerous proportions, and the greatest care is taken by merchants and manufacturers as to the extension of credits. Just at this time a good deal of apprehension is felt by investors and dealers in bonds and securities, lest railroad matters, which have been thus far kept pretty well in hand, for some reason, should become unruly. The troubles in the railroad situation, when reduced to our level, are these: There is a falling off in the volume of traffic and a consequent increase in the competition for traffic; the railroad war in the Northwest has not abated; Dominion lines are still monopolizing a good deal of the freight traffic; in fact, nearly all of the railroad companies between the Mississippi River and the Pacific, are as hastily as possible readjusting freight rates, lest the Inter-state Commerce Commission come down on them with heavy hands. One of the favorable features of the situation is the large amount of money that is anxiously awaiting investment, despite the fact that prices have been pointing downward, railway traffic diminishing, freights lower than a year ago, there is to-day, if the truth were known, more money awaiting investment than last year. This is not difficult to explain, from the fact that any one who has any knowledge of business, firmly believes that during the next twelve months, wide and more abundant opportunities will be opened for capital and enterprise than there have ever been. A great deal of money is seeking investment in Mexico and Central America; a few long-headed men are now engaged in schemes involving the outlay of a considerable capital in South America. A few months ago a good deal of apprehension was expressed over these lavish expenditures of the people's earnings, and the prediction was made that the outcome would be financial stringency; this prediction has proven false. There is as great a volume of money now in bank, if not greater; the surplus reserve in New York is larger, and everything goes to show that the opportunities for investment will be seized just as soon as the depressing influences which control the market at present shall have disappeared. Quite a number of prominent architects in the West have given it as their opinion that the present lull in activity will be followed by a healthful revival, although not of sufficient dimensions this season to make the volume of business up to that of last year. Plans are being made this year, which will, in their opinion, be carried out next year. Throughout the West all kinds of building material are in abundance and cheap. The demand for lumber in all Western markets is very heavy; prices have declined recently, and may drop a little more. The iron trade is in an unsettled condition, and competition in the crude product, between Alabama and Pennsylvania, is causing a great deal of disquietude. Consumers are profiting by it, and the producing interests themselves will be benefited by it in the long run. Steel-rails have dropped to $30 — the lowest point for two years — in the East. Large contracts cannot be had even at this price. There is a great deal of new mileage projected, and the probabilities are that when everything is rounded and evened up, there will be a steady, healthy demand for all kinds of mill and furnace products; but for the present iron and steel makers must be content with what they are able to do. The leading spirits in the iron trade, show their confidence in an ultimate satisfactory outcome, by projecting new furnaces and building additions to their mills. Several large steel-mills are under contract at this time; this can be accounted for on the grounds that steel is rapidly taking the place of iron for a large number of uses. As soon as railroad earnings show an improvement there will be large outlays for engines, cars, rails and track-supplies generally. The spirit of economy has seized the management of a good many systems; but it will not rule very long. A very interesting industrial feature of the present time, is the migration of the industries from one point to another where economy in manufacture and better traffic facilities can be secured. Northern industries are moving South; some Southern establishments are coming North; Eastern industries are going West to take advantage, in most cases, of natural-gas fuel; some Western concerns have come farther East. Glass-makers from all sections are flocking from old established centres to Ohio and Indiana, to use Natural gas. Large industries located in cities are moving into country places, and a variety of changes are being made, which show that the new forces which have come into play, viz., abundant and cheap fuel in new sections and new transportation facilities, are bringing about a readjustment and rearrangement. In addition to this, the host of little industries springing up in the far West, are creating new markets. This spreading of the industries into new fields, is illustrated by the fact that one of the largest steel-works in the country is being built near Chicago. Large casting and stove works are projected far West of the Mississippi. One of the largest blast-furnaces in the country is being erected at Duluth; flouring-mills are projected there, on a larger scale then even in Minneapolis. A multitude of machine-shops are going up along the lines of new railroads. A decentralization of industries is in progress, which will soon make the far West and South as thoroughly industrial in character as the New England and Middle States have been for thirty years past. This is a strengthening process. Our weakness in past decades was, that one section made iron; another produced coal; one grew cotton and another wheat. These conditions are changing rapidly; hereafter there will be no purely agricultural or cotton, or manufacturing section. The diversification in progress will result in an enormous multiplication of exchanges that will expand the need for commercial, financial, railroad, and all kinds of business and professional services.

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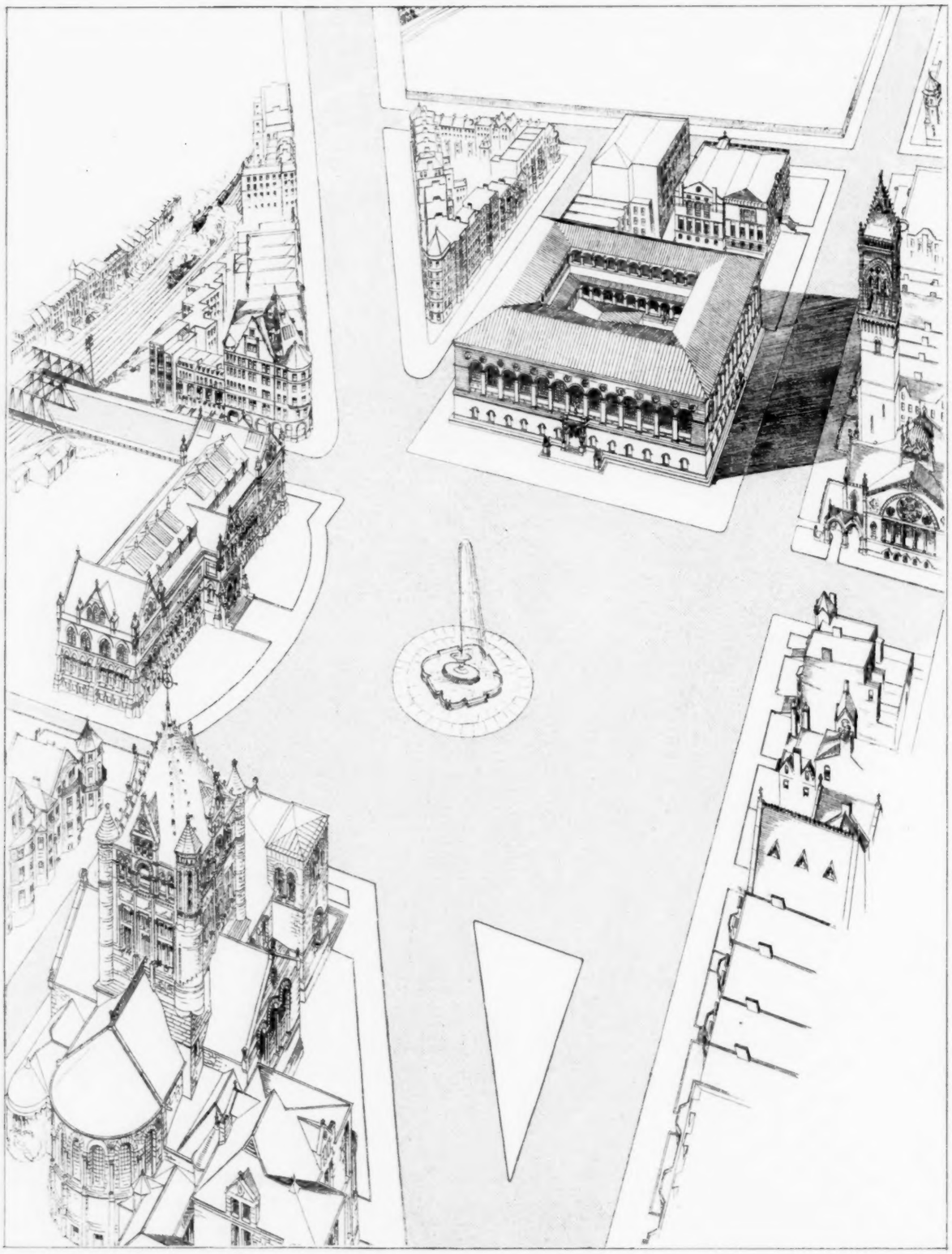

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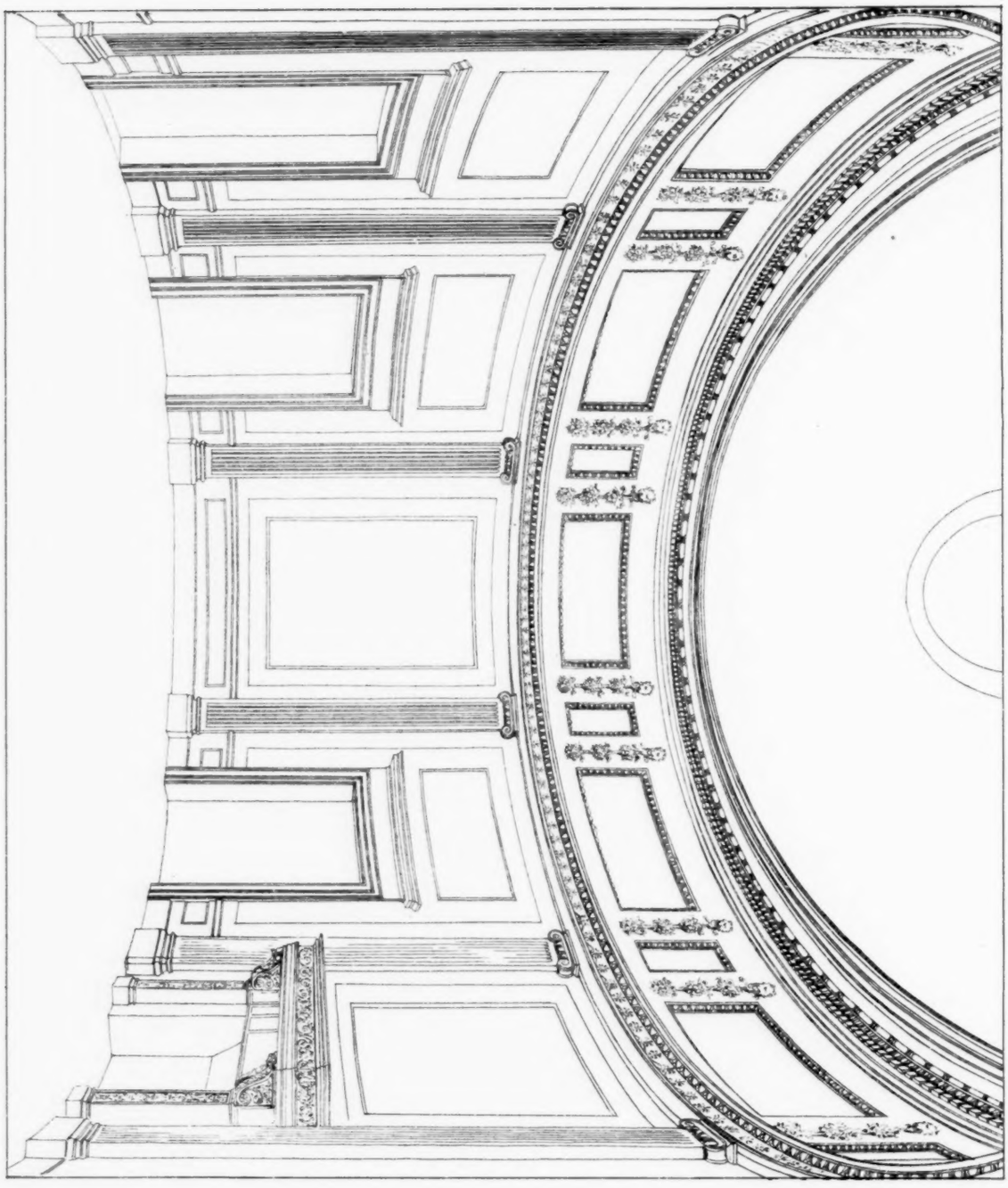

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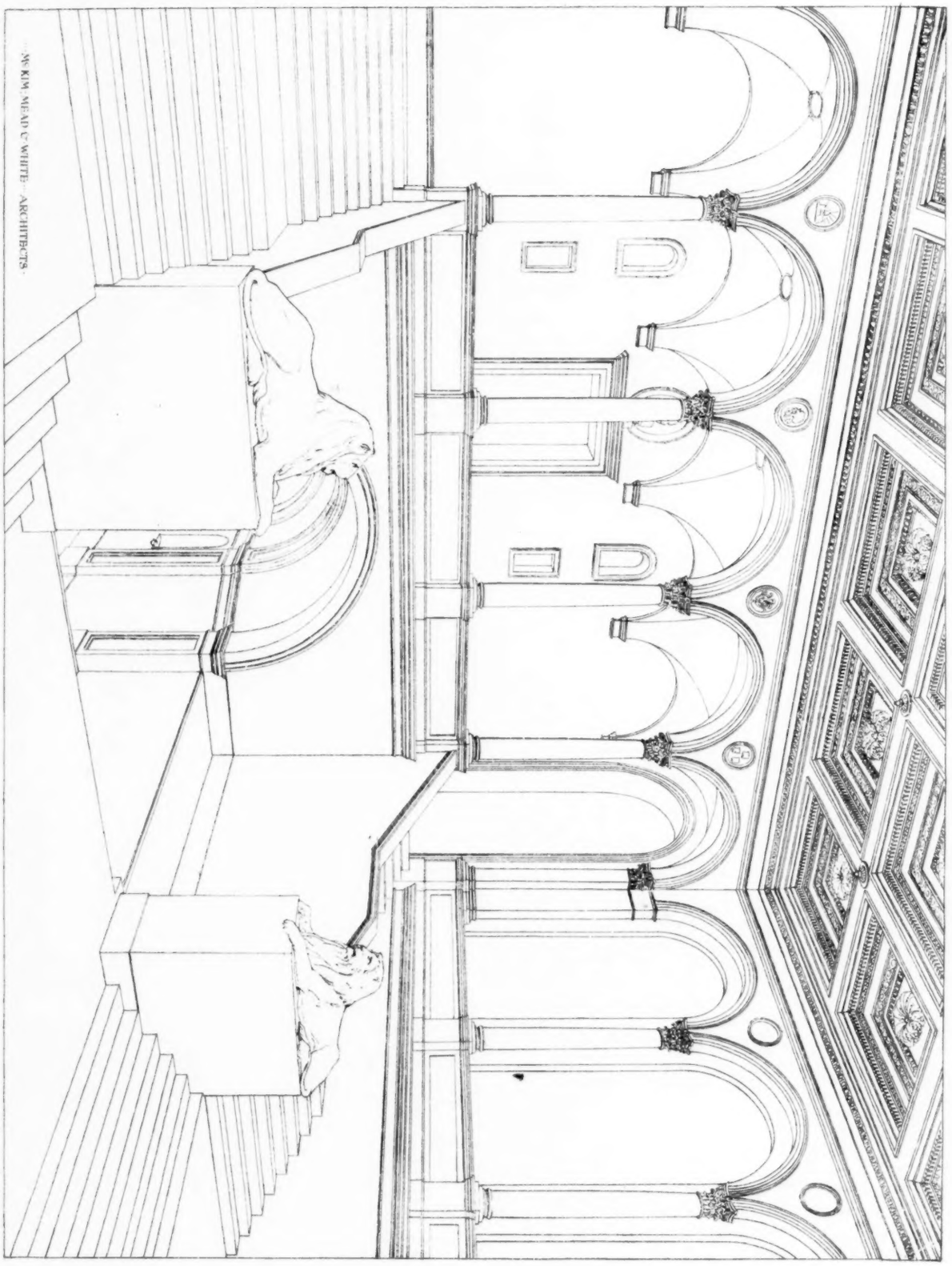

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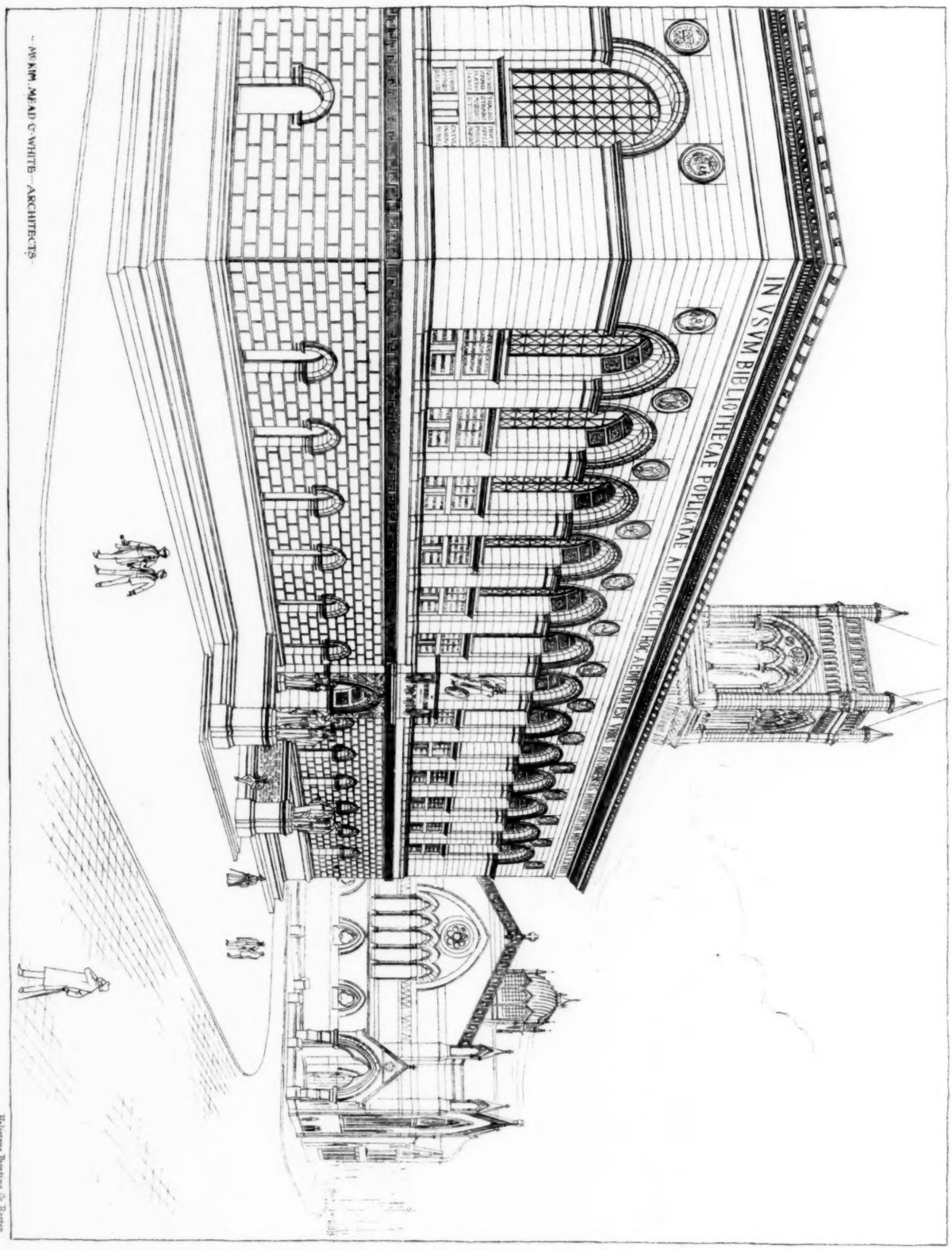

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